SEISMIC HAZARD EVALUATION

1230 12^{TH} STREET
MODESTO, CALIFORNIA

FINAL REPORT
May 2006

CITY OF MODESTO
AGREEMENT FOR CONSULTANT SERVICES
DATED DECEMBER 16, 2005

COMPLERE ENGINEERING GROUP, INC.
JOB NO. 25090

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EXECUTIVE SUMMARY

A seismic evaluation was conducted for the Building at 1230 12th Street in Modesto, California. The objectives of the evaluation were to identify structural and nonstructural deficiencies with respect to seismic force resistance.

The Building is a one-story reinforced masonry building founded on concrete spread and strip footings, with a concrete slab on grade. The building has exterior reinforced masonry walls with open web steel joists and a metal deck roof diaphragm. The building was expanded after original construction, adding almost 5000 square feet using similar construction. A 6 foot high masonry screen wall is located on the north side of the site, approximately ten (10) feet from the building.

A detailed seismic analysis of the Building was performed in accordance with the requirements of 1997 Uniform Code for Building Conservation (UCBC), Chapter 4, Minimum Standards For Existing Buildings. Consistent with the intent of these guidelines, the subject Building was evaluated according to the requirements in the 1997 Uniform Building Code (UBC).

A specific geotechnical evaluation was not prepared for this site. A geotechnical evaluation prepared by Goematrix Consultants, Inc., assessing seismic hazards for the Federal Building at 12th and I street, was used for the evaluation. This evaluation is considered applicable because of the Federal Building's close proximity to the study site. The subject Building site is located in Seismic Zone 3, according to the Uniform Building Code.

The seismic evaluation of the subject Building in Modesto, California has shown that the lateral force resisting system in the building does not meet the 1997 UCBC Chapter 4 Section 403, "Structural Safety", criteria for existing buildings, and requires strengthening. Elements requiring strengthening include the roof diaphragm, which can be strengthened by adding a new collector at the roof level, at two locations. Several of the nonstructural elements in the building also require additional bracing for seismic performances. Elements requiring strengthening are: ceilings, lighting fixtures, mechanical equipment and storage racks.

A construction cost estimate for the proposed structural and nonstructural strengthening measures was developed by Complere Engineering Group, Inc. For City of Modesto budgeting purposes, a total cost of 180,484.00, in May 2006 dollars, is estimated. This figure includes a 10 percent design contingency, a 7 percent construction contingency, and an allowance of 20 percent for general conditions and contractor's overhead and profit, as provided by City of Modesto for this project. In addition, it assumes complete occupancy of the subject Building while the work is in progress. The estimated construction time is .75 months (Three Weeks).

It is not unusual for hazardous materials to be present in buildings such as the subject Building in Modesto, California. Although both the evaluation and cost estimate for abatement/ disposal of any hazardous materials encountered in implementing the strengthening scheme presented is beyond the scope of this study, we recognize the potential for significant budget impact. Therefore, we recommend that a follow-up study be performed to coordinate the results of a hazardous materials investigation, by others, with this seismic strengthening scheme, particularly if the strengthening work is considered outside of a comprehensive hazardous materials abatement program.

I. INTRODUCTION

This report presents the findings of a seismic evaluation of subject Building at 1230 12th Street, in Modesto, California. This study had been performed by Complere Engineering Group, Inc. for the City of Modesto, Public Works Department.

The purpose of this study is to evaluate the degree of compliance of the building and upgrade the building in accordance with local practice and standards of care in Stanislaus County. Chapter 4 of the 1997 Uniform Code for Building Conservation (UCBC), which references the current edition, 1997, of the Uniform Building Code (UBC).

The evaluation consists of a review of both structural and nonstructural elements. A detailed structural analysis of the lateral load resisting system in the building was performed to identify deficiencies. Supplemental to the analysis, a limited site visit was performed on January 11, 2006 to verify existing conditions, identify damaged or distressed areas, and observe the nonstructural components. The project scope of work is included as Appendix A to this report.

II. BUILDING EVALUATION

A. Building and Site Description

The subject Building is located at 1230 12th Street, in Modesto, California at the corner of the intersection of 12th Street and M Street. A Vicinity Map shows the location of the building site in Figure 1. A Site Plan showing the orientation and location of the building on the site is shown in Figure 2. The site contains the subject Building which has an architectural masonry wall on the north side of the site, approximately ten (10) feet from the side of the building, and a parking lot to the east of the structure. This report includes an evaluation of the subject Building, and architectural masonry wall. The original structure was built in 1971 and an extension was added to the north side and southwest corner of the building in 1979. The subject Building has an approximate area of 13,120 square feet, 8240 square feet comprise the original building footprint, 4,880 square feet comprise the addition.

A specific geotechnical evaluation was not prepared for this site. In accordance with the scope of work for this project, a geotechnical report prepared by Geomatrix for the Seismic Evaluation and Upgrade Concepts for the Federal Building and U.S. Post Office, Modesto, California was used for soil properties and conditions for the evaluation of the subject Building. This geotechnical evaluation is included as Appendix D to this report.

As reported by Geomatrix Consultants, Inc. in the geotechnical assessment report for the Federal Building located at 12th Street and I Streets in Modesto, California, the site is located on an essentially flat area approximately one (1) mile north of the Tuolumne River. The site rests on alluvial deposits know as the Modesto Foundation derived from the granitic core of the Sierra Nevada. The ground surface evaluation at the site is approximately 90 feet above mean sea level.

The result of Geomatrix's Earthquake-Related Geotechnical Hazards Assessment are briefly summarized in the following paragraphs. The earthquake-related geotechnical hazards evaluated were strong ground motions, surface fault rupture, soil liquefaction potential, earthquake-induced total and differential settlement, earthquake-induced land-sliding, and earthquake-induced flooding.

The site is located in UBS Seismic Zone 3, and the nearest mapped active fault, the Vernalis Fault, is 14 miles west of the site. Geomatrix has estimated the Maximum Credible Earthquake on the Vernalis fault to be about M6.5. Geomatrix has reported that for purposes of estimating ground motions in the southern "Sacramento-San Joaquin delta area, the U.S. Bureau of Reclamation treats the Coast Ranges-Sierra Nevada Boundary Zone as a single, continuous, segmented fault source along the western margin of the Great Valley. They assign it a characteristic M of 6.5 and an average recurrence interval of 1000 years.

The potential for surface fault rupture at the site is considered to be negligible, earthquake-induced land-sliding, liquefaction potential and earthquake-induced flooding are all considered to be low to negligible. There are no known active faults in the immediate vicinity of the subject Building, which minimizes the potential for surface fault rupture. The vicinity of the site is generally flat and there are no large bodies of water near the building, other that the Tuolumne River. Therefore, Geomatrix concluded that the potential for earthquake-induced landsliding and earthquake-induced flooding are considered to be low to nonexistent.

The subject building is generally rectangular in plan, single-story and measures approximately 118 feet by 128 feet with a re-entrant corner at the south side of the building. The original structure was designed by The Office of the Supervising Architect of the U.S. Treasury Department. The original project drawings, dated 1967, including architectural and structural drawings, were made available to us for this study. The addition was designed by GSA. Project drawings, dated 3-15-77, including architectural and structural drawings, were made available to us for this study.

A floor plan of the building is shown in Figure 3. Photographs of the east and north sides of the subject Building are shown in Figures 4 and 5. Subject Building is constructed of reinforced masonry bearing walls with open web steel joists and metal deck roof diaphragm. It is founded on concrete spread and strip footings, with a concrete slab on grade.

The subject Building generally has an interior ceiling height of approximately ten (10) feet with a flat roof (1/4": 12") at approximately 14 feet above ground level. Observations during the site visit confirmed that the building is generally as shown on the original and addition drawings. The building materials appear to be generally in very good condition.

The masonry fence is separated from the structure by approximately ten feet along the north elevation. The fence is approximately four feet high and runs the length of the building. It is constructed of architectural reinforced brick bearing on a reinforced concrete strip footing. Figure 6 shows a photograph of the masonry fence. The materials in the fence and canopy appear to be generally in very good condition.

B. SEISMIC EVALUATION

Criteria

The evaluation of the subject Building was based on Chapter 4 of the 1997 Uniform Code for Building Conservation (UCBC). Section 403 – Structural Safety- requirements for compliance references Chapter 16 Design Requirements of the current edition, 1997, of the Uniform Building Code (UBC).

Seismic Analysis

A detailed seismic analysis of the subject Building was performed to identify any possible areas of weakness in the lateral force resisting system. The analysis is based on the details, dimensions, and materials indicated on the original structural and architectural drawings and addition drawings showing modifications to the original structure. During our site visit on January 11, 2006, we confirmed the as-built conditions of the original building and the addition on the north side and southwest corner in 1979. The alterations seemed to be in agreement with the drawings supplied by the City of Modesto. However, no finishes were removed, nor any destructive exploration done, to expose the actual existing details of construction.

Based on the criteria established by Chapter 16 of the 1997 UBC, the seismic base shear was calculated as shown below:

The UBC design base shear equation for the subject Building is as follows:

Zone	3
Distance to Fault	>15km
Source Type	
Soil Profile Type	Sd
Near Source Factor (Na)	1
Near Source Factor (Nv)	1

Static Force Procedure (1630.2)

Ct	CMU	=	0.02	
hn(ft)		=	15	(height in feet to top level of building)
Z		=	0.3	(Seismic Zone Coefficient for Zone 3)
I		=	1	(Importance Factor)
Ca =	0.36	x Na =	0.36	(Seismic Coefficient x Near-Source Factor)
Cv =	0.54	x NV =	0.54	(Seismic Coefficient x Near-Source Factor)
T =		$Ct(hn)^{3/4}$ =	0.15	
W =				(Total dead load of building)
			CMU	
R		=	5.5	(Structural System Factor)
(30-4)		V = (CvI/RT)W =	0.64	W (Base Shear Formula)
(30-5)		V = (2.5CaI/R) W =	0.16	W (Maximum Base Shear Formula)
(30-6)		V = 0.11CaIW =	0.04	W (Minimum Base Shear Formula)
(30-7)		V = (0.8ZNvI/R)W =	0.04	W (Minimum Base Shear Formula)

Earthquake Loads (1630.1)

E = pEh + Ev	Ev =	0	Allowable Stress Design
	Eh =	V	As calculated in 1630.2
	p =	1	

E = 0.1636 W

Equivalent Static Force (1612.3)

E/1.4 = 0.12 W

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Base shear from wind lateral loading was also examined for the subject Building and found to be lower than controlling seismic base shear. For a basic wind speed of 70 miles per hour, with Exposure B conditions, the UBC recommended critical lateral wind pressure is 7,350 pounds in the east-west direction.

The seismic base shear based on the Static Force Procedure required by the UBC for the subject Building is 16.36 percent of the building weight in each principle direction. The equivalent static force based on Equation 1612.3 of the 1997 UBC is the base shear, 16.36 percent, divided by 1.4, equal to 11.69 percent at an allowable stress. This value of 11.69 percent of the building weight is then comparable to the base shear from wind lateral loading. The building was then analyzed using a total building weight of 1,050 kips, and 11.69 percent of this weight equals a value of 126,000 pounds.

From the analysis and evaluation it was found that the roof diaphragm does not meet the requirements of the UBC and requires additional strengthening. It was also found that all of the existing masonry walls in the subject Building have sufficient strength to resist the required lateral loads due to earthquake. Furthermore, the connection of the roof diaphragm to the reinforced masonry walls has sufficient strength to resist wall out-of-plane forces at the top as prescribed by the UBC.

The exterior reinforced masonry fence was examined using criteria outlined in the 1997 UBC. The masonry fence was evaluated for an earthquake load of 18.0 percent of the weight of the fence and showed that the fence was adequate to resist earthquake loads as prescribed in the UBC.

Assessments and Recommendations

The subject Building in Modesto is generally in very good condition and shows a high quality of workmanship. The reinforced brick walls and attachment of the roof diaphragm to the walls are adequate to resist lateral forces due to earthquake as recommended in the provisions of the UBC. However, the metal deck roof diaphragm is inadequate to transfer shear to the shear walls in the north-south direction. This may be remedied by supplying a steel collector, at two locations - down the center of the structure aligning with the entrance wall, and near the East exterior wall aligning with the first interior 4ft wing wall. The deck shall be welded to these new collectors and connecting one end of the center collector to the concrete "cap beam" above the entrance of the building, and one end of the "East" collector to the concrete "wing wall". This is shown in Figures 3, SK7 and SK8. This mitigation would then transfer shear from the roof diaphragm to the two (2) exterior walls and and two (2) new interior shearwalls, one at the "front" wall near the entrance, and the other at the 4ft "wing wall", 25ft from the East exterior wall. These two upgrades will bring the building up to life-safe performance according to 1997 UCBC guidelines. Since this work involves the removal and replacement of two strips of existing roofing, it would be ideal that the construction could be performed at the time the building is re-roofed, if this is planned in the near future.

As part of the above mitigation, it may be prudent to perform a more comprehensive inspection to verify attachment to truss joists and secondary bracing systems to the main structure, while the roof system is exposed.

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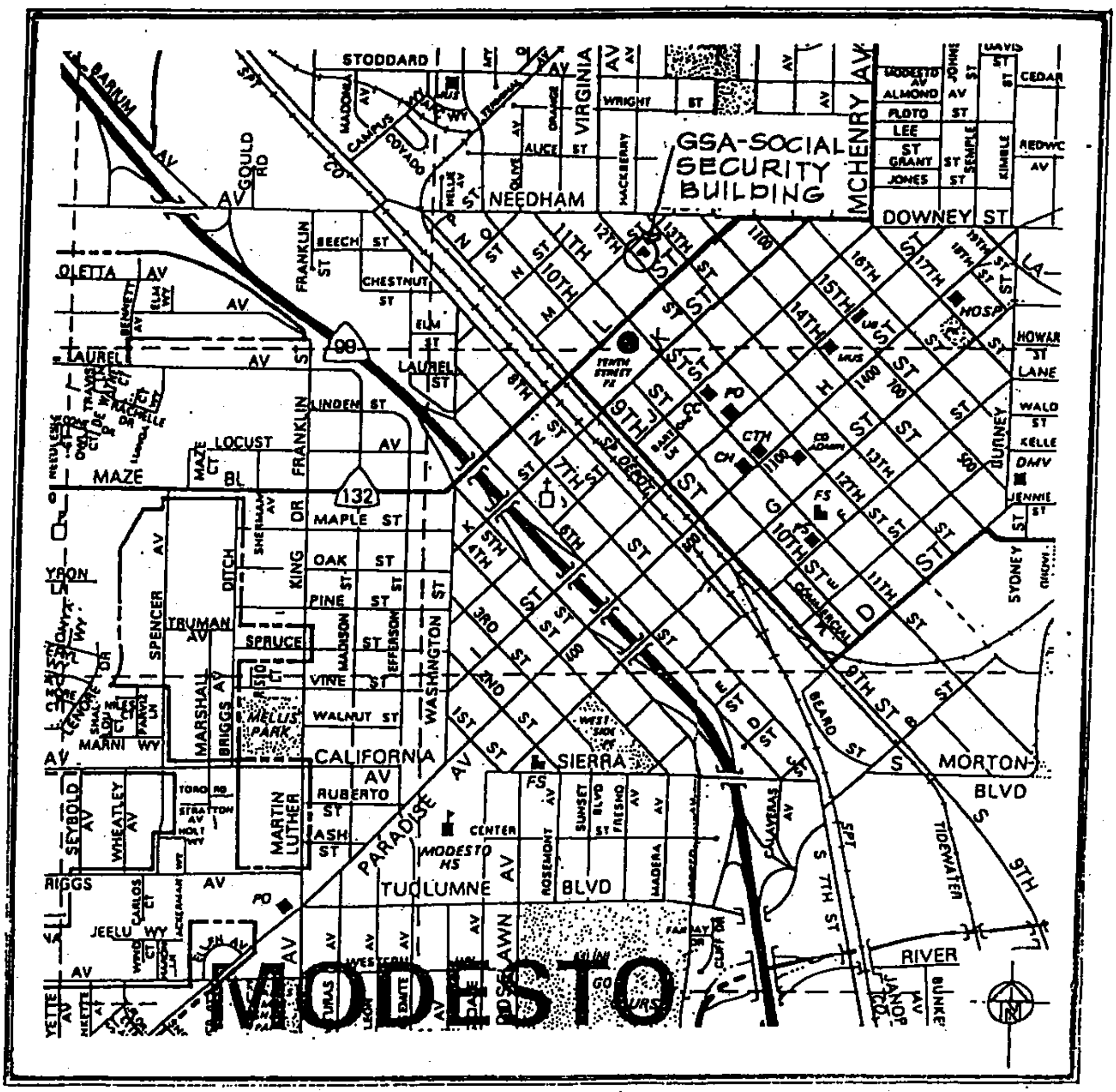

FIGURE 1
VICINITY MAP

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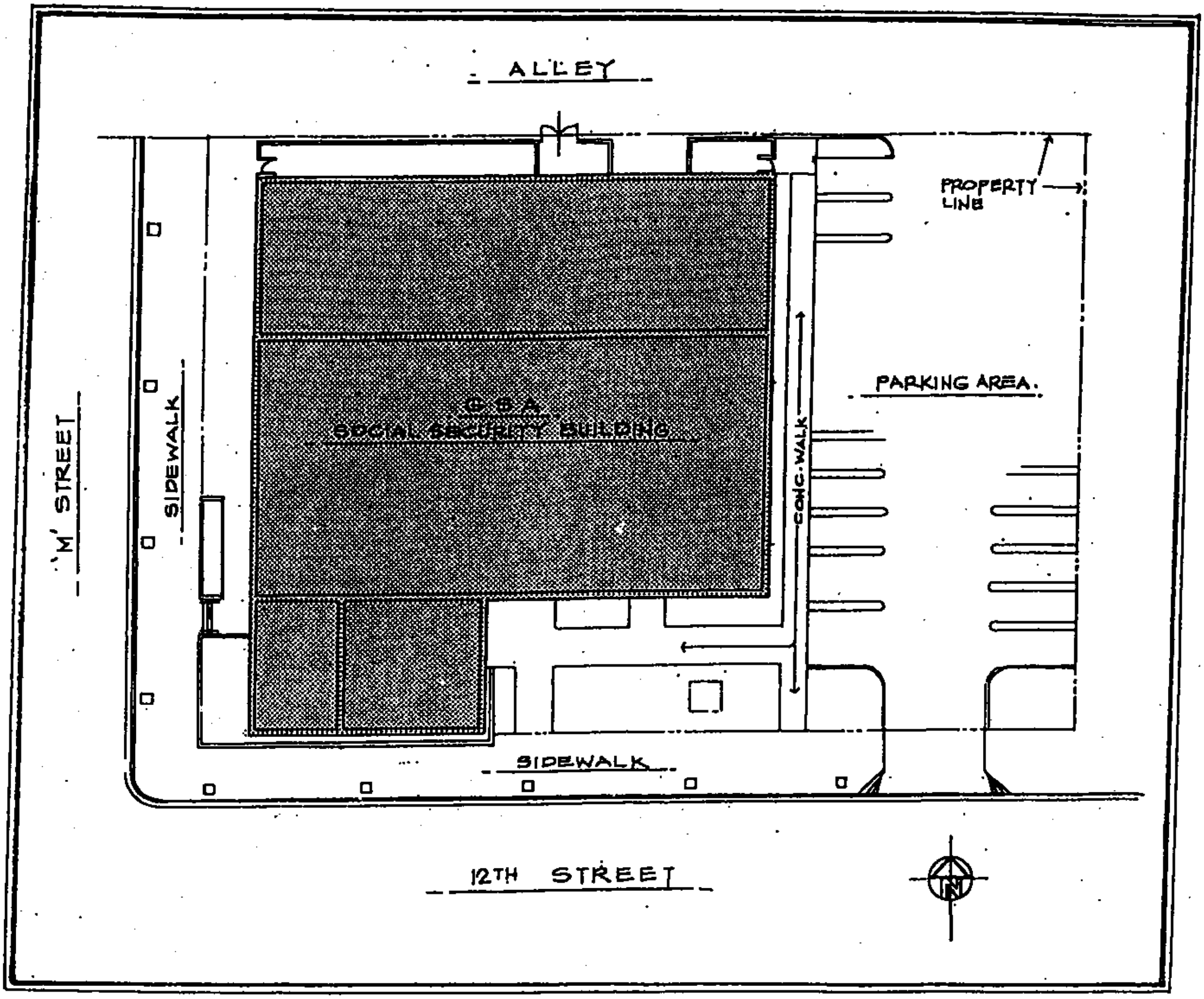

FIGURE 2
SITE PLAN

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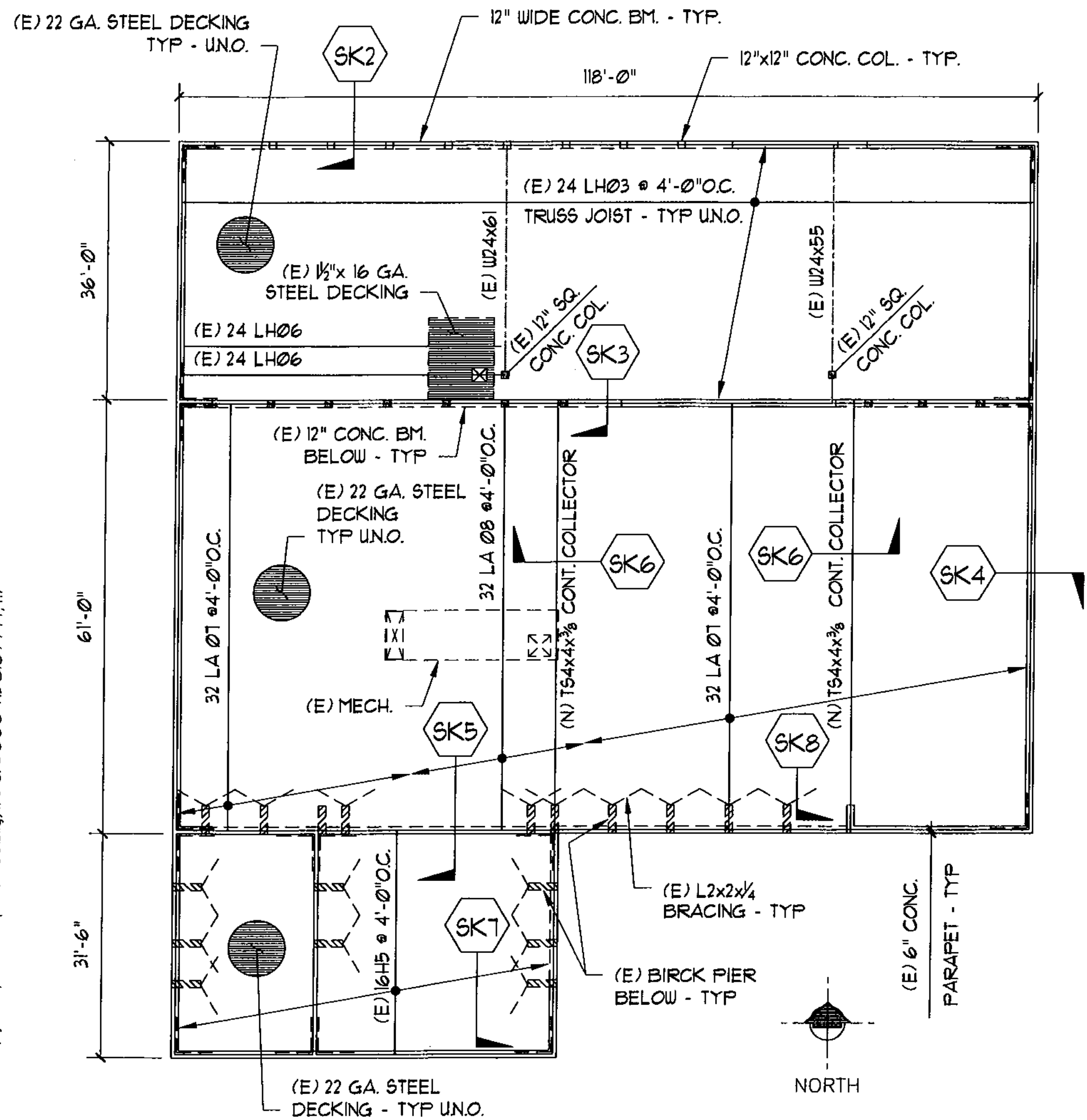

Project Name		Date	Project No.
City of Modesto - 1230 12th Street Seismic Upgrade		-	25090
Subject		DWG. NO.	
Roof Framing Plan		FIGURE 3	
-	Scale 1"=20'-0"	Checked RJL	

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FIGURE 4 - SOUTHWEST CORNER OF SUBJECT BUILDING

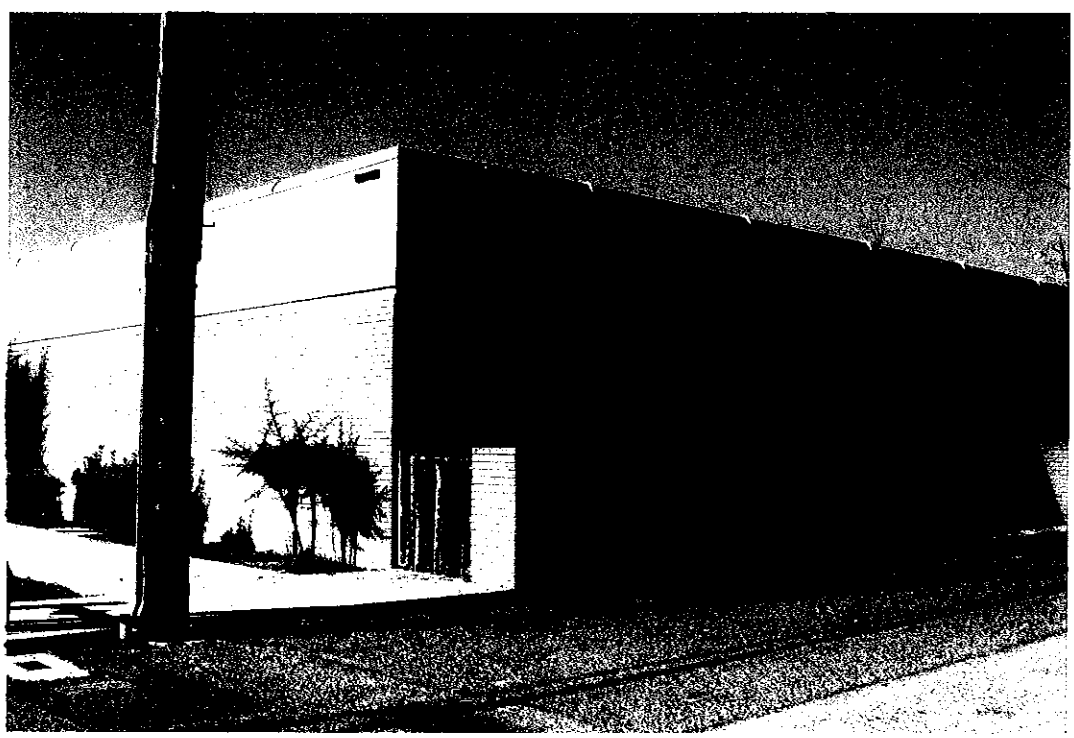

FIGURE 5 - NORTHEAST CORNER OF SUBJECT BUILDING

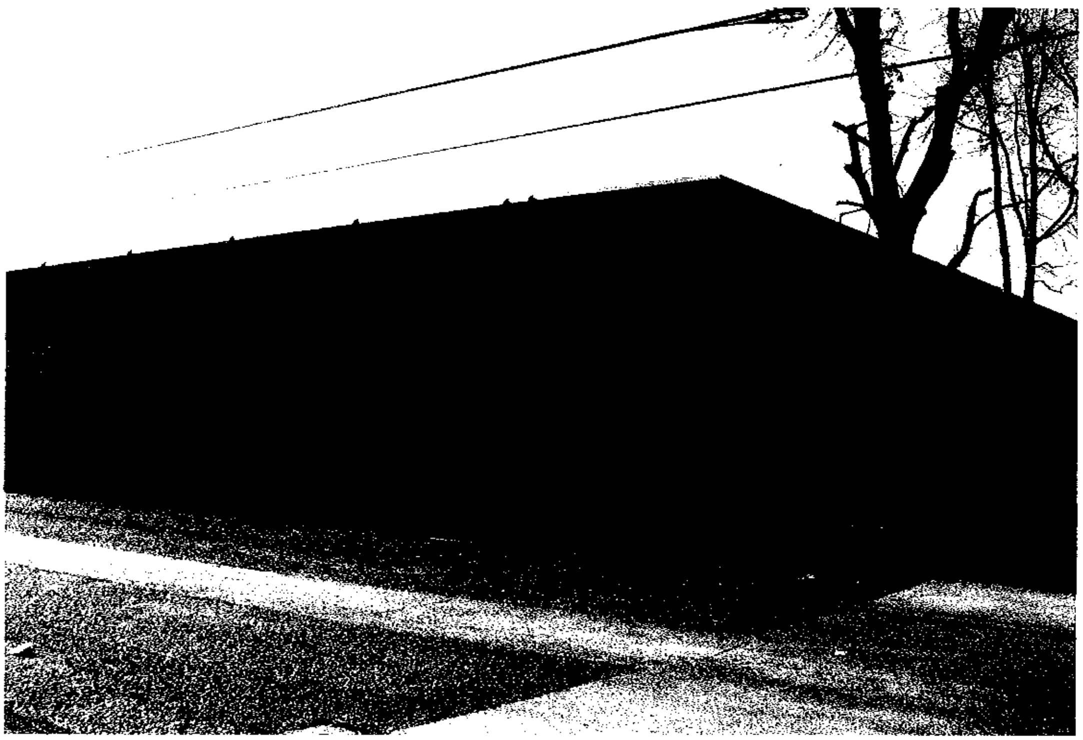

FIGURE 6 - MASONRY FENCE

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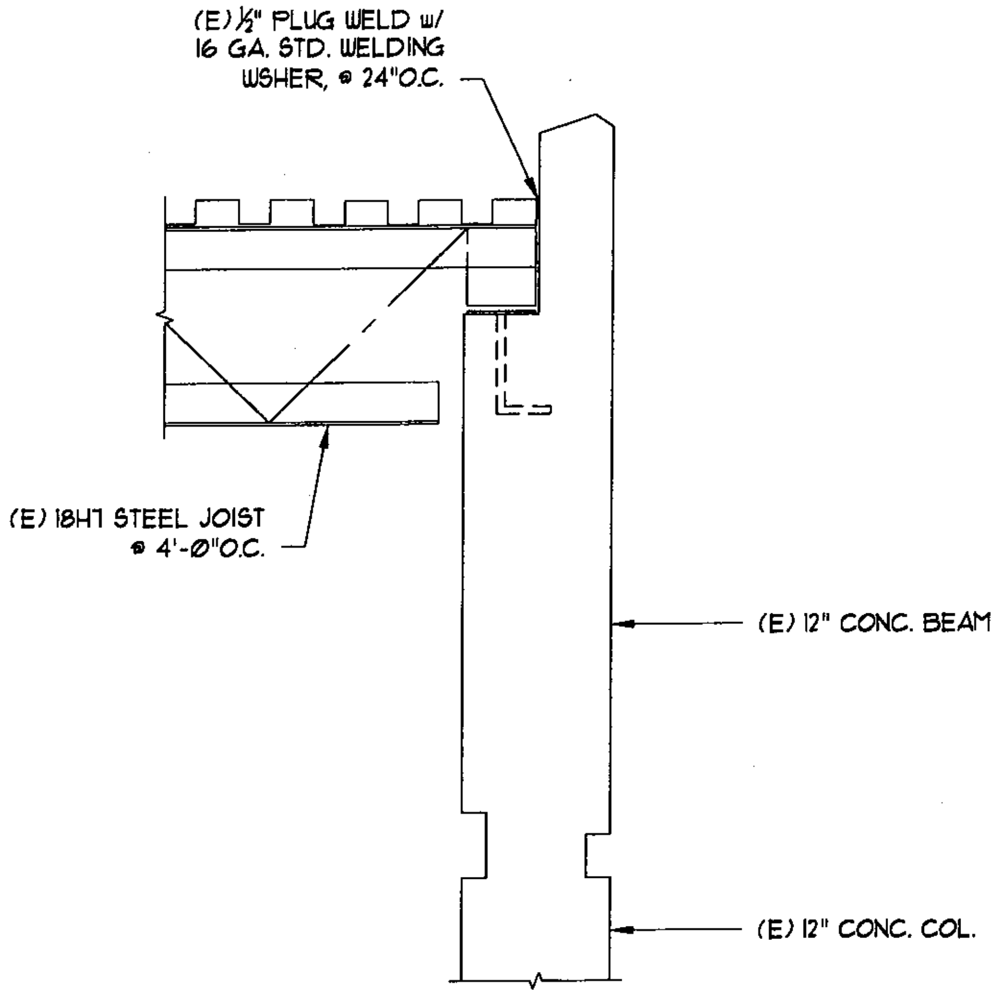

Project Name: City of Modesto - 123Ø 12th Street - Seismic Upgrade		Date: -	Project No.: 25Ø9Ø
Subject: Section		DWG. NO.: SK2	
-	Scale: 3/4"=1'-Ø"	Checked: RJL	

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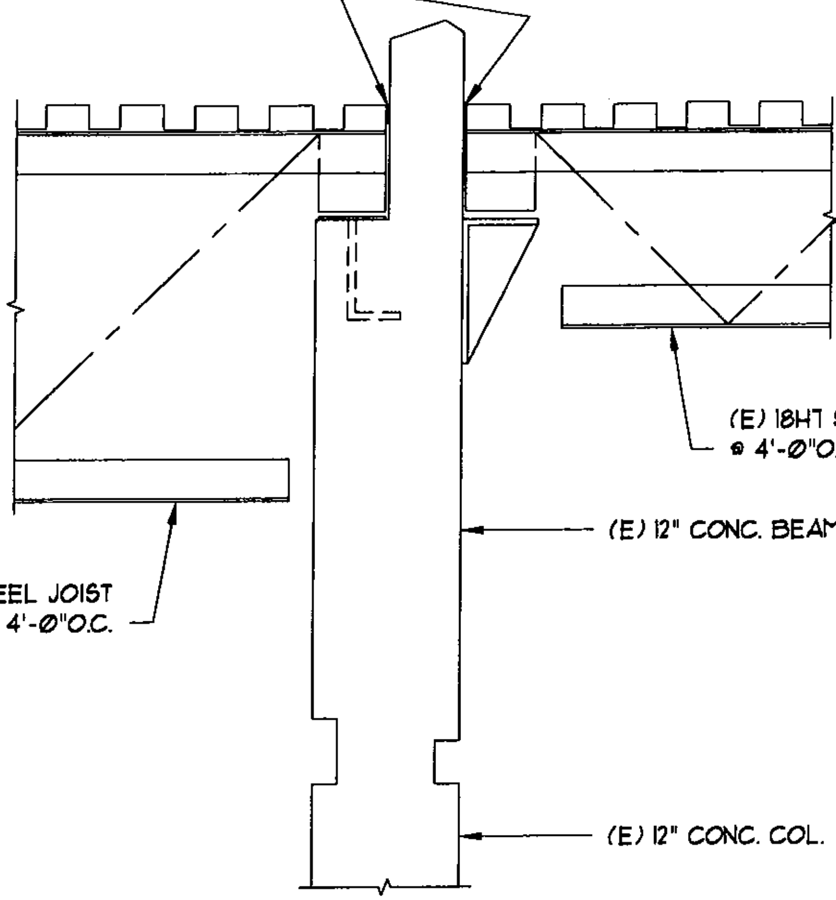

Project Name	Date	Project No.
City of Modesto - 123Ø 12th Street - Seismic Upgrade	-	25Ø9Ø
Subject: Section	DWG. NO.	SK3
REFERENCE ORIGIBAL DRAWING 7-3 BY: ROBERT STEVENS ASSOCIATES / Scale: 3/4"=1'-Ø" / Checked: RJL		

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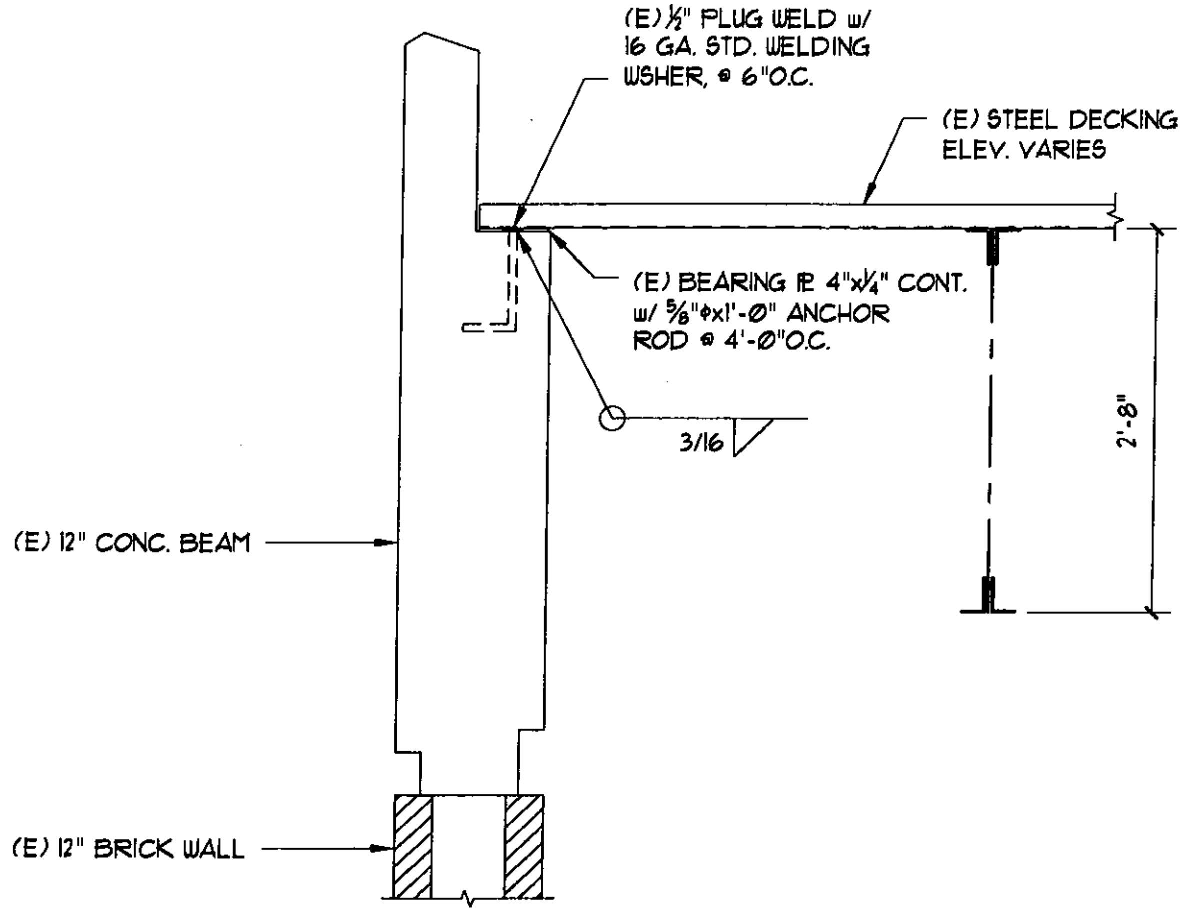

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Subject Section		DWG. NO. SK4	
REFERENCE ORIGIBAL DRAWING 1-3 BY: ROBERT STEVENS ASSOCIATES	Scale 3/4"=1'-Ø"	Checked RJL	

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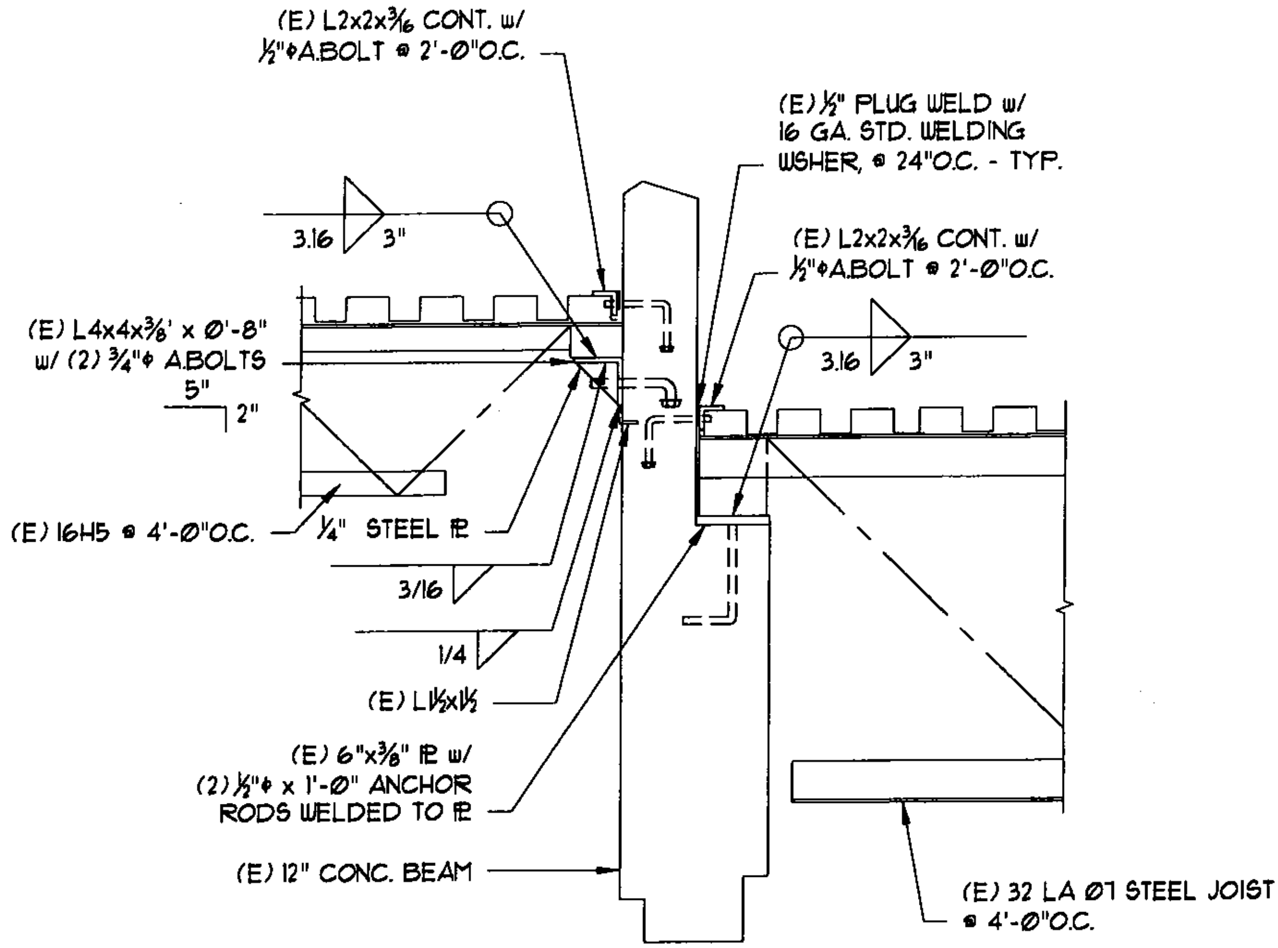

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Subject Section		DWG. NO. SK5	
REFERENCE ORIGIBAL DRAWING 7-3 BY: ROBERT STEVENS ASSOCIATES	Scale 3/4"=1'-0"	Checked RJL	

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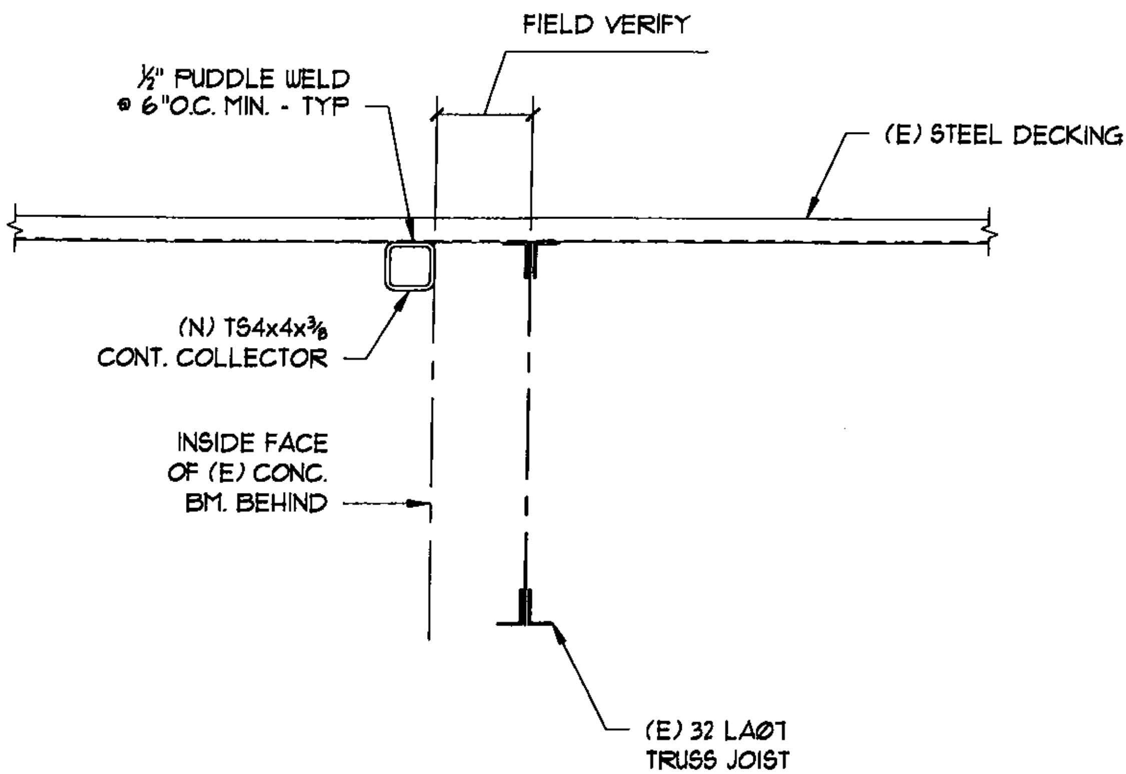

Project Name City of Modesto - 1230 12th Street - Seismic Upgrade		Date -	Project No. 25090
Subject DETAIL OF NEW COLLECTOR AT ROOF LEVEL		DWG. NO. SK6	
Scale 3/4"=1'-0"	Checked RJL		

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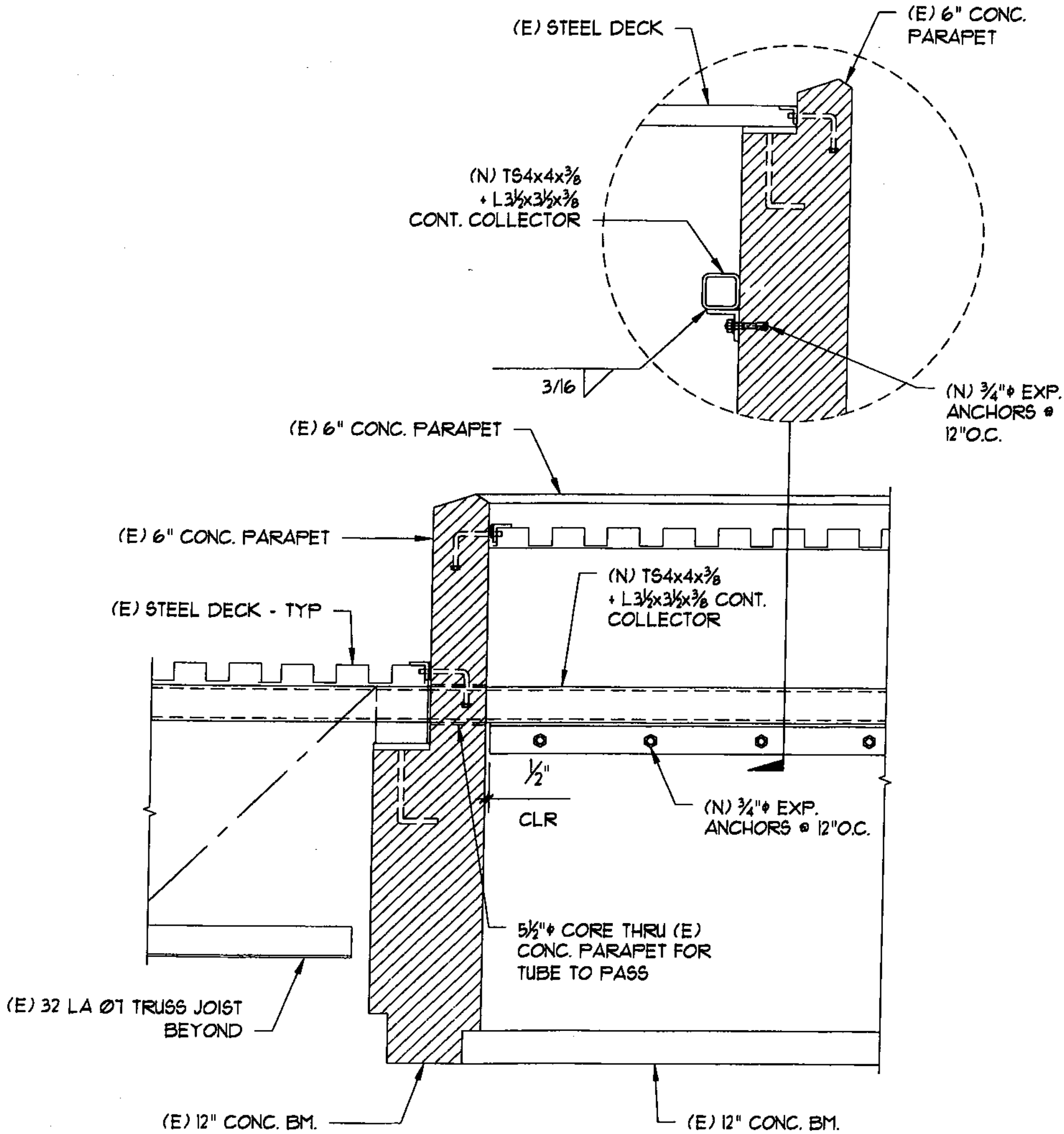

Project Name	Date	Project No.
City of Modesto - 123Ø 12th Street - Seismic Upgrade	-	25Ø9Ø

Subject		DWG. NO.
DETAIL OF NEW COLLECTOR THROUGH SOUTH WALL / CONNECTION WITH PARAPET		SK7
-	Scale 3/4"=1'-Ø"	Checked RJL

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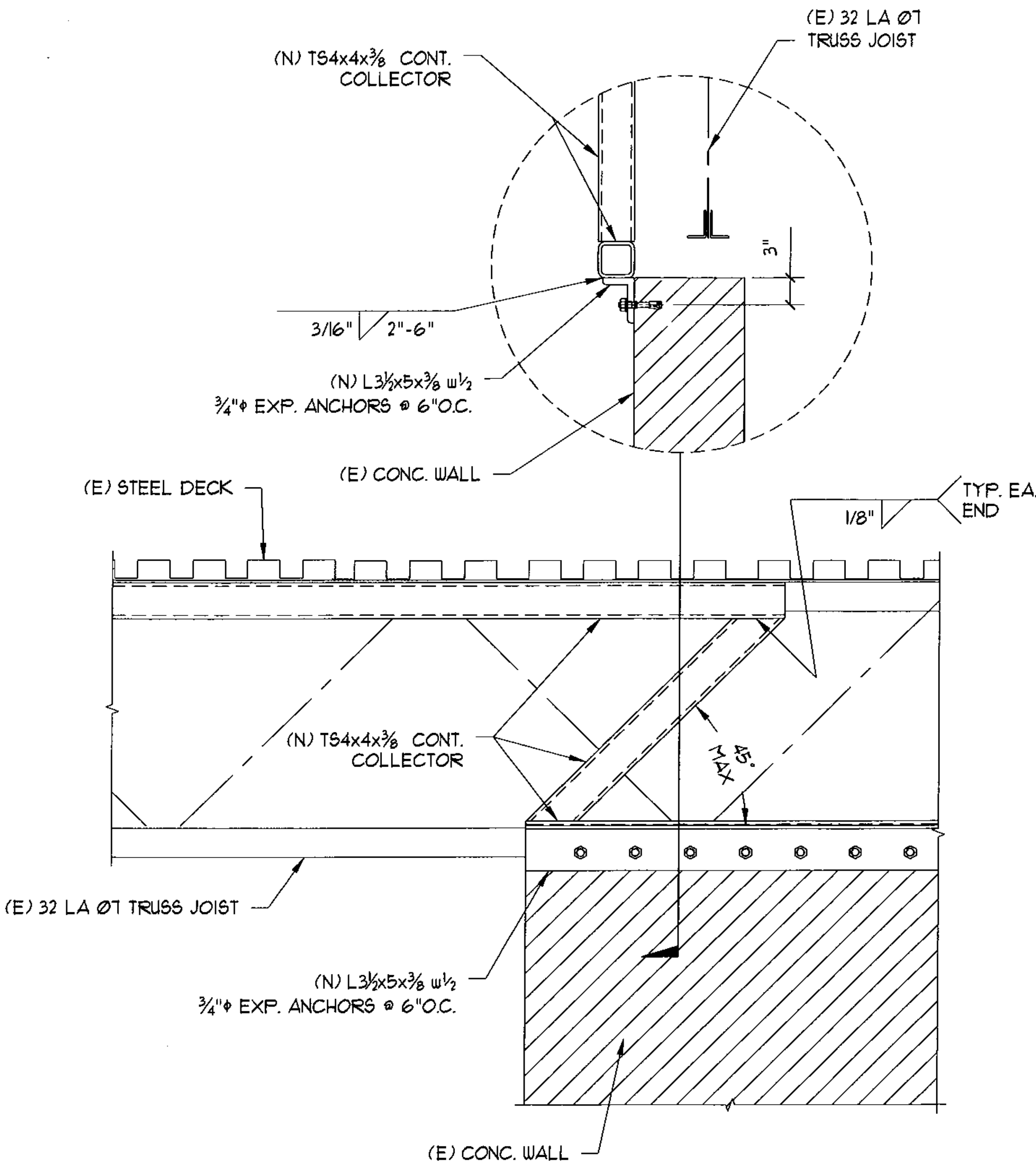

Project Name City of Modesto - 1230 12th Street - Seismic Upgrade		Date -	Project No. 25090
Subject DETAIL OF NEW COLLECTOR OVER EXISTING WALL		DWG. NO. SK8	
-	Scale 3/4"=1'-0"	Checked RJL	

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III. NONSTRUCTURAL COMPONENTS EVALUATION

A. Evaluation Criteria

In this section, the evaluation of the nonstructural elements in the subject Building in Modesto is discussed in detail. A qualitative evaluation of the nonstructural elements has been made in accordance with the 1997 UCBC, which references 1997 UBC. The qualitative evaluation included on-site observation to become familiar with the existing conditions, review the accuracy of the available drawings, and observe the buildings nonstructural components. No finishes or equipment panels were removed to expose anchorage or hidden elements. Structural calculations or other detailed evaluations of nonstructural items are beyond the scope of this report and were not performed for this evaluation.

The nonstructural components section of this report concludes with the completed Risk Assessment Forms.

B. Existing Nonstructural Components: Assessment and Recommendations

Partitions

Full height permanent and demountable interior partitions are located in various locations throughout the building. A representative partition of this type is shown in Photo NS-1. These partitions extend to the ceiling level and are constructed of metal studs with gypsum board. The drawings indicate that these partitions are not braced at the top and rely on the ceiling for lateral support. For seismic zone 3, additional lateral bracing for out of plane loads is required for these partitions. Some partitions contain glass which should be investigated or tested and replaced if not shatter resistant.

The toilet partitions observed were generally metal panels anchored to the wall, floor and ceiling as shown in Photo NS-2. The toilet partitions are in good condition and do not require additional bracing.

Ceilings and Light Fixtures

Two types of ceilings are located in the building. The most common ceiling type is a suspended exposed "T-grid" system with lay-in tiles and lay-in fluorescent lights. A section of building ceiling of this type is shown in Photo NS-3, which was heavily damaged due to recent burglary. This ceiling system does not have diagonal wire bracing, compression struts, or independent wire hangers for fluorescent lights. In the event of an earthquake, it would be expected that this ceiling would experience a large amount of damage including falling tiles and fluorescent lights. It is recommended that diagonal wires and compression struts be added to the ceiling and the fluorescent lights be hung with independent wire hangers to prevent falling hazards.

The other type of ceiling present in the building consists of suspended gypsum board. Some ceilings have acoustical tile cemented to the "office space" side of the gypsum board. The two (2) types of lighting systems observed in these ceilings are tube fluorescent lighting attached to a support strip and individual square lighting fixtures framed into the gypsum board. Photo NS-4 shows the ceiling in the toilet area which consists of hung gypsum board with a tube fluorescent lighting system. These ceilings and lighting systems are hung much in the same way as the "T-grid" ceilings described above. The gypsum board ceiling inherently has more stiffness and is constructed directly against exterior walls and interior partitions. These ceiling and lighting systems have performed well in previous earthquakes and do not require mitigation. No upgrades are recommended for the hung gypsum board ceiling.

Electrical Systems, Mechanical Equipment and Piping

The only substantial mechanical equipment in the building is the roof mounted HVAC units and domestic water heater. No substantial piping was observed above the ceiling system, although there was HVAC ducting present in the ceiling space which was un-braced. A photograph of a representative roof mounted HVAC unit is shown in Photo NS-5. The roof mounted HVAC units and the Electrical Panels appear to be well anchored and do not require mitigation. A photograph of the

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Electrical Panels is shown in Photo NS-6. The water heater in the janitorial closet lacks adequate positive anchorage to the structure. In order to prevent damage to the water heater, it is recommended that the top of the tank be more adequately attached to the structure and measures taken to reduce sliding at the base.

Storage Racks

Tall slender storage racks are located in some of the storage rooms. These racks are generally used to store various forms and office supplies. A photograph of a representative storage rack system is shown in Photo NS-7. The racks are anchored at the base or braced at the top. No corrective action is recommended.

C. GSA Risk Assessment Documentation

On the following pages, the completed GSA Risk Assessment Forms for the Social Security Building in Modesto are presented. The "Risk Percentage Inspection/ Evaluation Guides" were completed using the data obtained during the site visit. A risk percentage was calculated for each applicable component. Using the computed risk percentages, the items were each assigned a sensitivity rating on the "Sensitivity Scales for In-Place Components". The sensitivity rating values with the corresponding recommended actions are tabulated below:

Rating	Recommended Action
1	Dangerous: action must be taken
2	Somewhat dangerous: action should be taken
3	Action desirable but not urgent
4	No action required

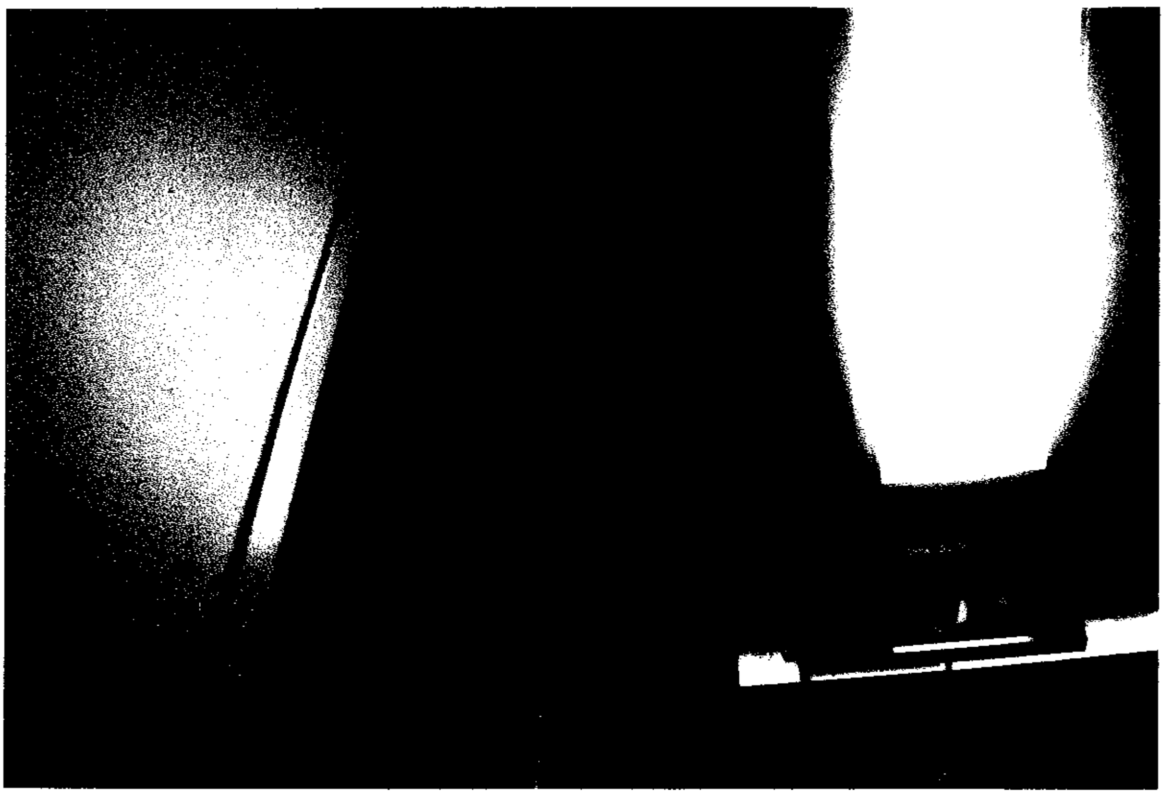

PHOTO NS-1 - FULL HEIGHT PARTITION

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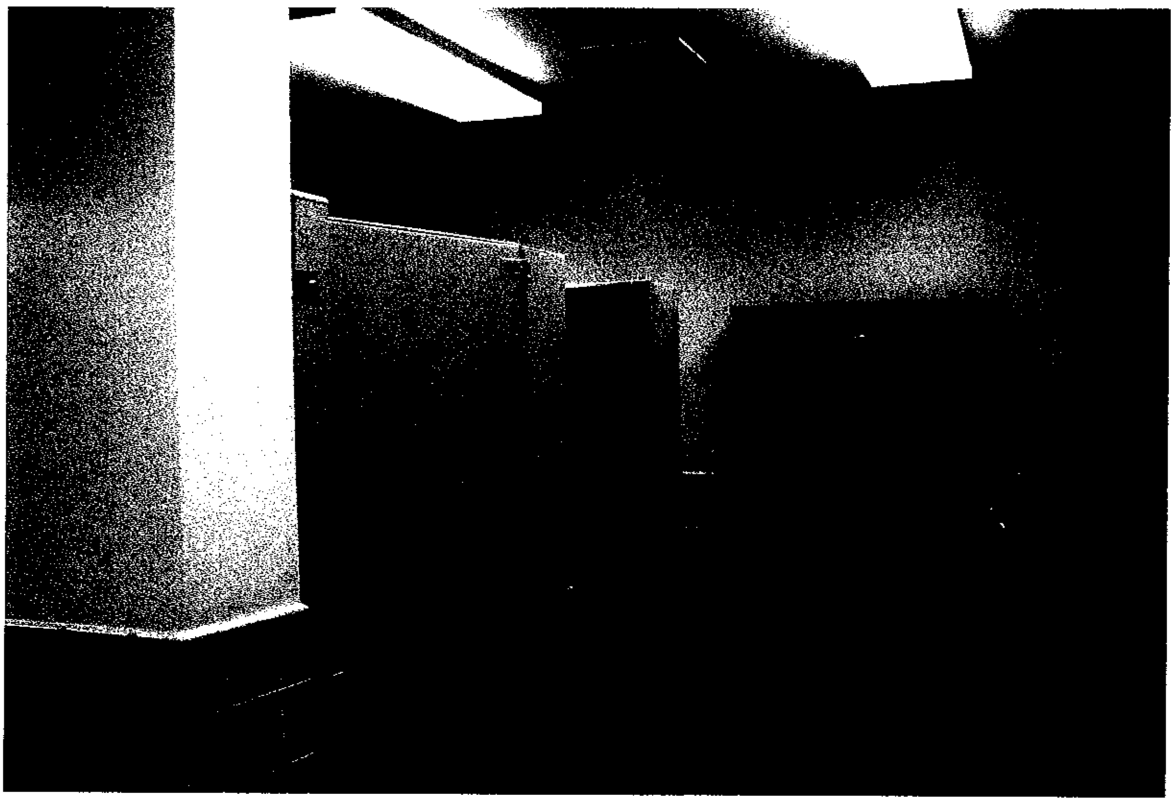

PHOTO NS-2 - TOILET PARTITIONS

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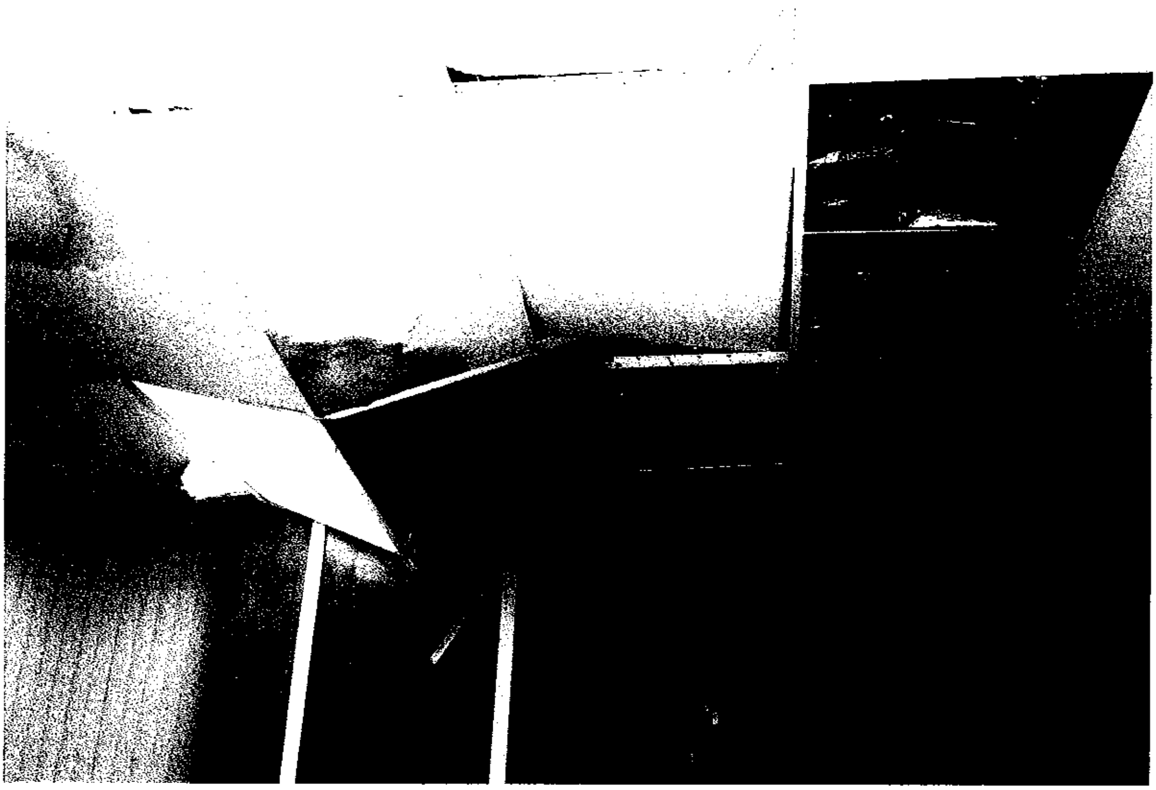

PHOTO NS-3 - T-GRID CEILING

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PHOTO NS-4 - GYPSUM BOARD HUNG CEILING

PHOTO NS-5 - HVAC AIR HANDLER ON ROOF

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PHOTO NS-6 - ELECTRICAL PANELS

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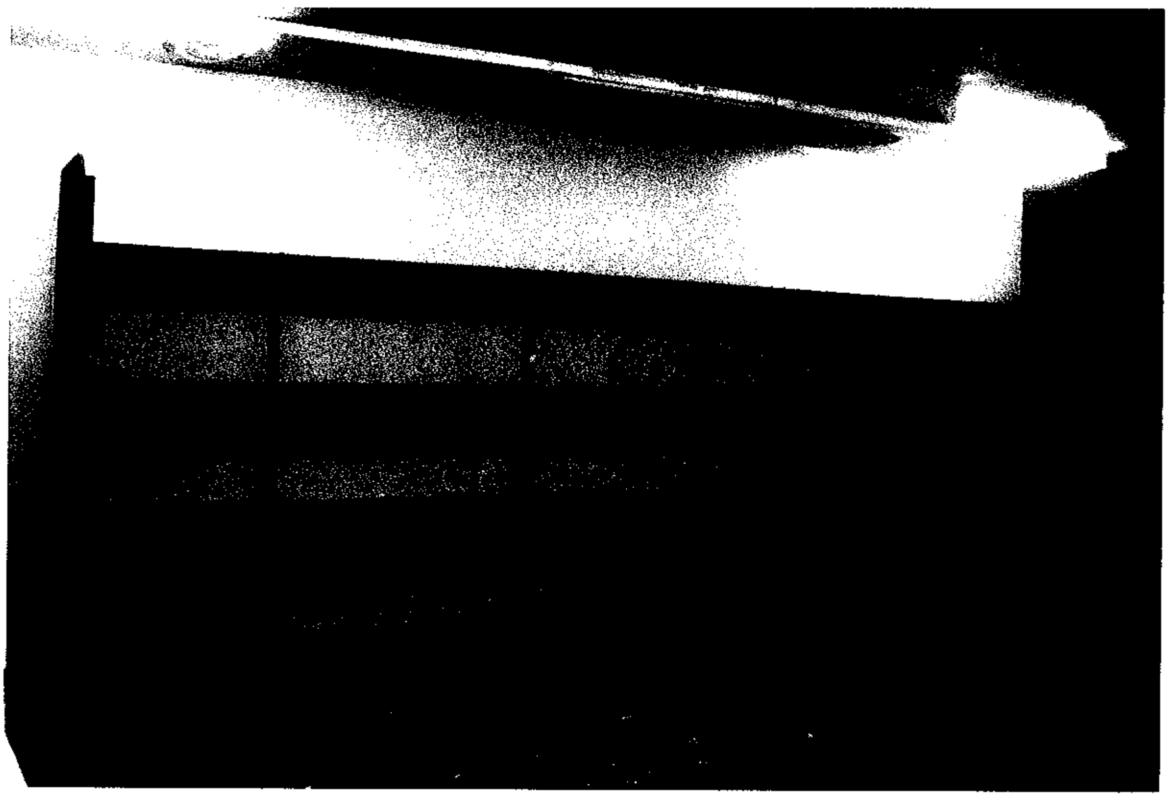

PHOTO NS-7 - STORAGE RACKS

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PARTITIONS

	No Positive Anchorage at Base	No lateral Bracing at Top	Anchored to More Than One Structural Element	No Cracing of Hanger System	No Internal Reinforcement and >8ft high	No Special Reinforcement for Hanging Furniture, etc	Crossing Building Seismic Joints	No Isolation Joints at Corners	No Control Joints	No Slip Joints at Top	Thinset Tile Application	Minimal Clearances at Pipe Sleeves for Piping	Piping/Conduit Tied to Other Structural Element	Small Head Nails Used for Connections	No Special Adhesives for Attachment	Number of Items Checked	Percent for Each Item	Total Percentage of Risk	Sensitivity Scale
PARTITIONS-PERMANENT																			
Clay Tile or Gypsum Block	LS	LS					LS										10.0		
Concrete Masonry	LS	LS			LS		LS										9.1		
Metal Stud/Plaster		X														1	10.0	10	4
Metal Stud/Gypsum Board		X														1	9.1	9	4
Wood																	9.1		
Solid Gypsum Board or Plaster																	8.3		
Metal Toilet Partitions																	20.0		
Marble Toilet Partitions																	20.0		
Metal Toilet Screens																	20.0		
PARTITIONS-DEMOUNTABLE FULL HEIGHT (TO CEILING)																			
Metal Panel																	9.1		
Metal and Glass		X														1	9.1	9	4
Wood																	9.1		
Wood and Glass																	9.1		
Miscellaneous																	9.1		
PARTIAL HEIGHT SCREENS																			
Metal Panel																	11.1		
Metal and Glass																	11.1		
Glass																	11.1		
Wood																	11.1		
Wood and Glass																	11.1		
Gypsum Board or Plaster																	9.1		
Miscellaneous Screens Not Positively Anchored																	20.0		
FURNISHING SYSTEMS																			
Plaster																	10.0		
Gypsum Board																	8.3		
Concrete Masonry																	10.0		
Metal Panel																	10.0		
PARTITION FINISHES																			
Ceramic Tile/Stone																	14.3		
Wood Paneling																	14.3		

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CEILINGS

	Vertical Support From Other Than Structure	No Lateral or Diagonal Bracing	Ceiling Systems Not Designed to Support Lighting Fixtures	No Lateral Bracing for Partitions	Isolation at Perimeters or at Structural Elements	No Expansion Joints in Large Room Areas	Ceiling Crosses Seismic Joints Without Expansion Provisio	Small Head Nails or Normal Strength Adhesive Used	No Control Joints	Openings for Pipes/Ducts Not Designed for Pipe Deflections	Ceiling Used as a Supply Plenum	Number of Items Checked	Percent for Each Item	Total Percentage of Risk	Sensitivity Scale
SUSPENDED SYSTEM															
Concealed Spline with Acoustic Tile		LS											11.1		
Exposed T-grid with Lay-in Tile		X		X		X						3	11.1	33	2
metal Pan		LS											11.1		
Plaster		LS											10.0		
Gypsum Board		X										1	9.1	9	4
SURFACE APPLIED SYSTEMS															
Tile-Glued to Structure													20.0		
Gypsum Board													16.7		
Gypsum Plaster													20.0		
SPECIAL CEILINGS															
Luminous Systems		LS											11.1		

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ELECRTICAL SYSTEM

	Not Positively Anchored at Base	Not Laterally Braced at Top and Height/Depth >3	No Flexible Braided Connections	Crosses Seismic Joints Without Expansion Joints	No Under-voltage Relays	No Separate Ground Connector Across Joints	Long Fuel Lines to Generator	Located Near Critical Occupancies	Vibration Isolators With No External Constraints	Isolators Not Secured to Structure	Number of Items Checked	Percent for Each Item	Total Percentage of Risk	Sensitivity Scale
Bus Duct												33.3		
Conduit												33.3		
Panels											0	33.3	0	4
Transformers												33.3		
Switchboards												33.3		
Emergency Generator												14.3		
Emergency Generator Fuel System												33.3		
Battery Racks												50.0		
Motor Starters												20.0		

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LIGHTING FIXTURES

	Hanger Wire or Other Supports Not Positively Connected	No Lateral Bracing of Fixture	No Lateral Bracing of Support Bracket	No Sway Bracing or Damping Devices	Supported From Demountable Partition	Long Rigid Stems (Over 12 in.)	Open Link Chain or Hanger Hook	Diffuser/Grille of Glass or Heavy Material	Diffuser/Grille Not Attached to Frame or No Safety Chains	End to End Assemblies	Number of Items Checked	Percent of Each Item	Total Percentage of Risk	Sensitivity Scales
FLOURESCENT CEILING IXTURES														
ecessed Lay-in	X	X									2	20.0	40	2
Semi-Recessed Lay-in												20.0		
urface Mounted									X		1	20.0	20	4
tem Hung												14.3		
Chain Hung												16.7		
NCANDESCENT CEILING IXTURES														
Recessed												20.0		
Surface Mounted											0	25.0	0	4
tem Hung (Globe)												14.3		
hain Hung												16.7		
Ornamental Chandelier												20.0		
acking Lighting												25.0		
ALL FIXTURES														
Surface Mounted												20.0		
ecessed												20.0		
MERGENCY LIGHTING														
Battery Powered												25.0		
xtra Lights												25.0		

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FURNITURE and FURNISHINGS

	No Positive Anchorage at Base	No Lateral Bracing at Top	No Safety Rail, Chain, or Lip Across Shelves	No Positive Connection Between Shelves and Fram	No Positive Engagement of Door Latch	No Doors	Wheels Unrestrained	No Internal Reinforcement or Protection from Vibrati	Number of Items Checked	Percent for Each Item	Total Percentage of Risk	Sensitivity Scale
SHELVING RACK/OPEN SHELVING												
Floor Supported Height/Depth >3			X					X	1	20.0	30	3
Floor Supported Height/Depth <3										20.0		
Wall Mounted										25.0		
Storage (Lab or Haz. Mat.)										20.0		
Floor Supported (Lab or Haz. Mat.)	LS	LS								20.0		
Wall Mounted (Lab or Haz. Mat.)										25.0		
Bookcases (Lab or Haz. Mat.)										20.0		
STORAGE CABINETS AND BOOK STACKS (OVER 5 FT.)												
Floor Supported (Over 5 FT.)	LS	LS								20.0		
Wall Mounted										25.0		
FILES												
Lateral or Standard										20.0		
Plan or Map										20.0		
Motor Operated										20.0		
Desk Top & Revolving										20.0		
Wall Mounted										25.0		
DESKS												
Wall Mounted										30.0		
Floor Supported										33.3		
Vital Furniture										25.0		
COMPUTER EQUIPMENT												
Wheel Mounted										33.3		
Stationary										25.0		
Tape/Disk Storage										16.7		

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ELEVATOR SYSTEMS

ELEVATOR SYSTEMS	No Counterweight Retainer Brackets	Counterweight Rails Not Reinforced	No Restraints For Motor Generator Sets	Control Panels Not Securely Fastened to Structural Frame	No Rope Guard on all Sheaves	No Seismic Switch or Collision/Derallment Device	Dumbwaiter Machine Not Fastened to Structure	Pump Unit and Tank Not Fastened to Structure	No Emergency Power System	No Emergency Voice Communication System	No Emergency Lighting	Number of Items Checked	Percent for Each Item	Total Percentage of Risk	Sensitivity Scale
Traction (Geared)	LS	LS											11.1		
Traction (Gearless)	LS	LS											11.1		
Hydraulic (Personnel)													16.7		
Hydraulic (Freight)													16.7		
Dumbwaiter (Geared)													20.0		
Dumbwaiter (Gearless)													20.0		

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MECHANICAL EQUIPMENT

	Vibration Isolators Not Fastened to Structure	No Lateral and Vertical Restraint for Isolators	Equipment with Motors Not Anchored to Isolators	Not Positively Connected to Structure	Tanks Not Laterally Braced	Equipment Not Laterally Braced	Equipment Legs Not Specially Designed for Earthquake Forces	Equipment Not Secured to Support	Number of Items Checked	Percent for Each Item	Total Percentage of Risk	Sensitivity Scale
Boilers										33.3		
Chillers	LS	LS								33.3		
HVAC Pumps	LS	LS							0	33.3	0	4
Storage,Expansion,Treatment,Tanks										25.0		
Fans	LS	LS								25.0		
Coils										33.3		
Domestic Water Pump	LS	LS								33.3		
Fire Pump	LS	LS								33.3		
Hot Water Heaters				X		X	X	X	4	25.0	100	2
Water Softners										25.0		
Pneumatic Tanks										25.0		

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PIPING AND HVAC

	No Lateral Bracing	Long Runs Connected to Different Structural Elements	Cross Building Seismic Joints Without Expansion (HVAC Flexible)	No Expansion Allowed Between Structural Elements	No Guides at Expansion Compensators	Rigid Connections Between Piping and Equipment	Fittings Not Welded, flanged, Mechanical Jt., (HVAC Soldered)	Fittings Not Soldered, Gasketed or With Compression Jts.	Pipe Sleeves Too Narrow for Sufficient Pipe Movement	No Earthquake Sensitive Shut-Off Valve	No Portable Gas Leak Detector Available	Number of Items Checked	Percent for Each Item	Total Percentage of Risk	Sensitivity Scale
PROCESS PIPING															
Cold Water													14.3		
Hot Water													14.3		
Drainage													11.1		
Sanitary and Vent													11.1		
Gas	LS									LS			11.1		
Compressed Air													14.3		
Vacuum													14.3		
MECHANICAL AND FIRE PROTECTION PIPING															
Standpipe wet & dry													12.5		
Sprinkler wet & dry													12.5		
Chilled Water													12.5		
Hot Water													12.5		
Condenser Water													12.5		
Steam													12.5		
Condensate													12.5		
Buried Pipe													12.5		
HVAC													12.5		
Ductwork	X											1	16.7	20	3

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SENSITIVITY SCALE FOR IN-PLACE COMPONENTS

COMPONENT	TOTAL PERCENTAGE OF RISK 0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
PARTITIONS-PERMANENT											
Hollow Clay Tile or Gypsum Block	4	4	4	4	3	3	2	1	1	1	1
Concrete Masonry	4	4	4	3	2	2	1	1	1	1	1
Metal Stud/Plaster	4	4	4	3	3	2	2	1	1	1	1
Metal Stud/Gypsum Board	4	4	4	4	3	3	2	2	1	1	1
Wood	4	4	4	4	4	3	3	3	2	2	1
Solid Gypsum Board or Plaster	4	4	4	4	4	3	2	2	1	1	1
Toilet Partitions											
Metal	4	4	4	4	3	3	2	2	2	1	1
Marble	4	4	3	3	2	2	2	1	1	1	1
Metal Screens	4	4	4	4	3	3	3	3	2	2	2
PARTITIONS-DEMOUNTABLE											
Full Height (To Ceiling)											
Metal Panel	4	4	4	3	3	2	2	1	1	1	1
Metal and Glass	4	4	4	3	2	2	1	1	1	1	1
Wood	4	4	4	3	3	3	2	2	1	1	1
Wood and Glass	4	4	4	3	2	2	1	1	1	1	1
Miscellaneous	4	4	4	3	3	2	2	2	1	1	1
Partial Height Screens											
Metal Panel	4	4	4	4	3	4	3	3	2	2	1
Metal and Glass	4	4	4	4	3	3	3	2	2	1	1
Glass	4	4	4	3	3	3	2	2	1	1	1
Wood	4	4	4	4	4	3	3	3	2	2	2
Wood and Glass	4	4	4	4	3	4	3	3	2	2	1
Gypsum Board or Plaster	4	4	4	4	4	3	3	2	2	1	1
Miscellaneous, Screens Not Positivetly Anchored	4	4	4	4	4	4	3	3	2	2	2
FURRING SYSTEMS											
Plaster	4	4	4	4	3	3	3	3	2	2	2
Gypsum Board	4	4	4	4	4	3	3	3	2	2	2
Concrete Masonry	4	4	4	3	3	3	2	2	2	1	1
Metal Panel	4	4	4	4	3	3	3	2	2	2	1
PARTITION FINISHES											
Ceramic Tile/Stone	4	4	4	4	4	4	3	3	3	3	2
Wood Paneling	4	4	4	4	4	3	3	3	2	2	2

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SENSITIVITY SCALE FOR IN-PLACE COMPONENTS

	TOTAL PERCENTAGE OF RISK										
COMPONENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
CEILING SUSPENDED SYSTEMS											
Concealed Spline W/Acoustic Tile	4	4	3	3	2	2	1	1	1	1	1
Exposed T-Grid w/Lay-In Tile	4	4	3	2	2	1	1	1	1	1	1
Metal Pan	4	4	3	2	2	1	1	1	1	1	1
Plaster	4	4	4	3	3	2	2	2	1	1	1
Gypsum Board	4	4	4	4	3	3	2	2	1	1	1
Cement Plaster	4	4	4	3	2	2	2	1	1	1	1
SPECIAL CEILINGS											
Luminous Systems	4	4	3	2	2	1	1	1	1	1	1
ELECTRICAL SYSTEM											
Bus Duct	4	4	4	3	3	3	2	2	2	1	1
Conduit	4	4	4	3	3	3	2	2	2	1	1
Panels	4	4	3	3	3	2	2	2	2	1	1
Transformers	4	4	3	3	3	2	2	2	1	1	1
Switchboards	4	4	3	3	3	2	2	2	1	1	1
Emergency Generator	4	4	4	4	3	3	3	2	1	1	1
Fuel System	4	4	4	4	4	3	2	2	1	1	1
Battery Racks	4	4	4	3	3	3	2	2	1	1	1
Motor Starters	4	4	3	3	3	3	2	2	1	1	1
LIGHTING FIXTURES											
Fluorescent Ceiling Fixtures											
Recessed Lay-In	4	4	3	2	2	2	1	1	1	1	1
Semi-Recessed Lay-In	4	4	4	3	2	2	1	1	1	1	1
Surface Mounted	4	4	4	3	2	2	1	1	1	1	1
Stem Hung											
Single Stem	4	4	3	2	1	1	1	1	1	1	1
Two Short Stems	4	4	4	3	3	2	1	1	1	1	1
Two Long Stems	4	4	3	2	1	1	1	1	1	1	1
End to End Assemblies	4	4	4	3	2	1	1	1	1	1	1
Chain Hung											
Separate Fixtures	4	4	3	2	2	1	1	1	1	1	1
End to End Assemblies	4	3	2	2	1	1	1	1	1	1	1

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SENSITIVITY SCALE FOR IN-PLACE COMPONENTS

COMPONENT	TOTAL PERCENTAGE OF RISK 0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Incandescent Ceiling Fixtures											
Recessed	4	4	4	4	3	3	2	2	1	1	1
Surface Mounted	4	4	4	3	2	2	2	1	1	1	1
Stem Hung (Globe)	4	4	3	2	2	1	1	1	1	1	1
Chain Hung	4	4	4	3	3	2	1	1	1	1	1
Ornamental Chandelier	4	4	4	3	3	2	2	1	1	1	1
Track Lighting	4	4	4	3	2	2	1	1	1	1	1
Wall Fixtures											
Surface Mounted	4	4	4	3	3	3	2	2	1	1	1
Recessed	4	4	4	4	4	3	3	2	2	2	1
Emergency Lighting											
Battery Powered	4	4	4	4	3	3	3	3	2	2	1
Exit Light	4	4	4	4	4	3	3	3	2	2	1
FURNITURE AND FURNISHINGS											
Storage Racks and Open Shelving											
Floor Supported, Height/Depth >3	4	4	4	3	2	2	1	1	1	1	1
Floor Supported, Height/Depth <3	4	4	4	3	3	3	2	2	1	1	1
Wall Mounted	4	4	4	3	2	2	2	1	1	1	1
Storage (Laboratory or Haz. Mat.)	4	4	3	2	2	1	1	1	1	1	1
Floor Supported (Lab. or Haz. Mat.)	4	4	3	2	2	1	1	1	1	1	1
Wall Supported (Lab. Or Haz. Mat.)	4	3	2	2	2	1	1	1	1	1	1
Bookcases (Laboratory or Haz. Mat.)	4	4	4	3	3	3	2	2	1	1	1
Cabinets and Book Stacks											
Floor Supported Over 5" High	4	4	4	4	3	3	3	2	2	2	1
Wall Mounted	4	4	4	3	3	2	2	1	1	1	1
FILES											
Lateral or Standard	4	4	4	3	3	3	2	2	1	1	1
Plan or Map	4	4	4	4	3	3	3	2	2	2	1
Motor Operated	4	4	4	3	3	2	2	1	1	1	1
Desk Top Revolving	4	4	4	3	3	3	2	2	2	1	1
Wall Mounted	4	4	3	3	2	2	1	1	1	1	1
DESKS											
Wall Mounted	4	4	3	3	2	2	1	1	1	1	1
Floor Supported	4	4	4	4	4	3	3	3	2	2	2
Vital Furniture	4	4	4	3	3	2	2	2	1	1	1
COMPUTER EQUIPMENT											
Wheel Mounted	4	4	4	4	3	3	3	2	2	1	1
Stationary	4	4	4	3	3	3	2	2	1	1	1
Tape/Disc Storage	4	4	4	4	4	3	3	2	2	1	1

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SENSITIVITY SCALE FOR IN-PLACE COMPONENTS

COMPONENT	TOTAL PERCENTAGE OF RISK 0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
ELEVATOR SYSTEMS											
Traction (Geared)	4	3	3	2	2	2	1	1	1	1	1
Traction (Gearless)	4	3	3	2	1	1	1	1	1	1	1
Hydraulic-Personnel	4	4	4	3	3	2	2	2	1	1	1
Hydraulic-Freight	4	4	4	3	3	3	3	2	2	1	1
Dumbwaiter (Geared)	4	4	4	4	4	3	3	3	3	2	2
Dumbwaiter (Gearless)	4	4	4	4	4	3	3	3	3	2	2
MECHANICAL EQUIPMENT											
Boilers	4	4	3	3	2	2	2	1	1	1	1
Chillers	4	4	4	4	4	3	3	3	2	2	2
HVAC Pumps	4	4	4	4	4	3	3	3	2	2	2
Storage Tanks	4	4	4	3	3	2	2	2	2	1	1
Treatment & Expansion Tanks	4	4	4	4	3	3	2	2	1	1	1
Fans	4	4	4	4	4	3	3	2	2	2	2
Coil	4	4	4	4	4	3	3	2	2	2	2
Domestic Water Pumps	4	4	4	4	3	3	3	3	2	2	2
Fire Pumps	4	4	3	2	1	1	1	1	1	1	1
Hot Water Heaters	4	4	4	4	4	3	3	2	2	2	2
Water Softeners	4	4	4	4	4	3	3	2	2	2	2
Pneumatic Tanks	4	4	4	4	3	3	3	3	2	2	2
PROCESS PIPING											
Cold Water	4	4	4	4	3	3	2	2	1	1	1
Hot Water	4	4	4	4	3	3	2	2	1	1	1
Drainage	4	4	4	3	3	2	2	2	2	2	1
Sanitary and Vent	4	4	4	3	3	2	2	2	2	2	1
Gas	4	4	3	3	2	2	2	1	1	1	1
Compressed Air	4	4	4	4	3	2	2	2	2	2	2
Vacuum	4	4	4	4	3	2	2	2	2	2	2
MECHANICAL AND FIRE PROTECTION PIPING											
Standpipe-Wet and Dry	4	4	3	3	2	2	2	2	1	1	1
Sprinkler-Wet and Dry	4	4	3	2	2	2	2	1	1	1	1
Chilled Water	4	4	4	3	3	3	3	2	2	2	2
Hot Water	4	4	3	3	2	2	2	1	1	1	1
Condenser Water	4	4	4	4	3	3	3	2	2	2	2
Steam	4	4	3	3	2	2	2	2	1	1	1
Condensate	4	4	3	3	2	2	2	2	1	1	1
Buried Pipe	4	4	4	3	3	3	2	2	2	1	1
HVAC											
Ductwork	4	4	3	3	3	3	2	2	2	1	1

IV. CONSTRUCTION COST ESTIMATE

A construction cost estimate for the proposed structural strengthening measures was developed by Complere Engineering Group, Inc. The complete Cost Estimate is presented in Appendix B.

The cost estimate is based on a single phase project with the building completely occupied during construction. An allowance has been included to account for a shift premium due to off-hours work. The cost estimate specifically excludes professional design, testing, inspection and management fees, fire and risk insurance and phased construction. A complete description of inclusions is provided in Appendix C.

It is not unusual for hazardous materials to be present in buildings of this age. Although both evaluation and cost estimation for abatement/ disposal of hazardous materials is beyond the scope of this study, a brief discussion is provided herein for consideration. Existing items potentially containing hazardous materials, which would be removed or disrupted in implementing the proposed strengthening scheme, include but are not necessarily limited to ceilings, floor coverings, mechanical systems, and paint. Since there are several factors involved in associating a cost with abatement and disposal, it is not possible at this stage to assess a meaningful estimate. Therefore, we recommend that a follow-up study be performed to coordinate the results of a hazardous materials investigation, performed by others, with the seismic strengthening scheme presented in this study, and any other applicable concerns. This follow-up study could approximately address the potential budget impact of hazardous materials, particularly if the seismic strengthening work is considered outside of a comprehensive hazardous materials abatement program.

A construction cost estimate for the proposed structural strengthening scheme was developed by Compelre Engineering Group, Inc. For City of Modesto budgeting purposes, a total construction cost of $180,484.00 for the subject Building, in May 2006 dollars, is estimated. This figure includes a 10 percent design contingency, a 7 percent construction contingency, and an allowance of 20 percent for general conditions and contractor's overhead and profit, as provided by City of Modesto for this project. In addition, it assumes complete occupancy of the subject Building. Based on a gross area of 13,120 square feet, the total estimated seismic upgrade cost represents approximately $13.76 per square foot. The estimated construction time is approximately .75 months (Three Weeks).

V. CONCLUSIONS

The seismic evaluation of the subject Building in Modesto, California has shown that the lateral force resisting system in the building does not meet the 1997 UCBC guidelines for Structural Safety criteria for existing buildings, and requires strengthening. In addition to the building, the separate masonry fence was evaluated. The fence meets with 1997 UBC criteria and does not require strengthening.

Several of the nonstructural elements in the building require additional bracing for seismic performance. Elements requiring strengthening are: partitions, ceilings, lighting fixtures and domestic water heater and storage racks.

A construction cost estimate for the proposed structural strengthening scheme was developed by Complere Engineering Group, inc. For City of Modesto budgeting purposes, a total construction cost of $180,484.00 for the subject Building, in May 2006 dollars, is estimated. This figure includes a 10 percent design contingency, a 7 percent construction contingency, and an allowance of 20 percent for general conditions and contractor's overhead and profit, as provided by City of Modesto for this project. In addition, it assumes complete occupancy of the subject Building. Based on a gross area of 13,120 square feet, the total estimated seismic upgrade cost represents approximately $13.76 per square foot. The estimated construction time is approximately .75 months (Three Weeks).

VI. REFERENCES

Degenkolb, Siesmic Hazard Evaluation, Social Security Administration Building, Modesto, California, Final Report June 1997.

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APPENDIX A

PROJECT SCOPE OF WORK

Complere Engineering Group, Inc. 4230 Kiernan Ave., Suite 210, Modesto, CA 95356 Tel 209.545.8165 Fax 209.545.8170

I. Scope Of Work

To provide a complete and thorough seismic investigation and evaluation of the subject property for the purpose of identifying seismic structural and non-structural deficiencies, developing recommendations for corrective actions in accordance with local practice and standards of care in Stanislaus County, and developing a construction cost estimate for the required corrective actions.

II. Services Included

2.1 The Engineer shall provide a <u>Seismic Upgrade – Evaluation Report</u> (Structural and Non-Structural) complete with construction cost estimate for required corrective actions, calculations, sketches, photographs and drawings as appropriate.

2.2 The building shall be investigated for the purpose of evaluating the resistance of structural and non-structural components to earthquake forces and shall identify and document all damages and distress areas of the building and its component parts.

2.2.1 The Engineer shall visit the site and become familiar with the existing conditions of the structure, including any variations from available existing drawings.

2.2.2 Analysis of structural components and overall seismic integrity of the building shall be based on the criteria of the "1997 Uniform Code for Building Conservation", Section 403. Unless otherwise directed by the City of Modesto, this document shall be used as benchmarks for the evaluation of the seismic strength of the structure. The performance objective shall be "Structural Safety" in accordance with Section 403. The following seismic coefficients shall be used:

Ca = 0.36 Cv = 0.54 I = 1.0

A structural evaluation shall be prepared summarizing the work and indicating areas of structural degradation or non-conformance. The significance of each deficiency shall be discussed.

2.2.3 If necessary, recommendations for at least one feasible upgrading scheme shall be developed and provided. Various types of strengthening methods such as the addition of new shear walls or bracings, strengthening of existing structural elements (e.g., addition of shotcrete to existing shear walls) shall be considered.

2.2.4 Engineer shall comment on the degree of risk to the building from any seismic-related geologic hazard, and the building structural evaluation report shall include a discussion of the relative life-safety and economic loss importance of structural hazards resulting from ground shaking versus geotechnical hazards.

2.2.5 Architectural appendages to the building exterior, such as parapets and ornaments, shall be specifically analyzed for strength and stability for the requirements given in paragraph 2.2.2 above.

2.2.6 Evaluation of non-structural components shall follow the methodology outlined in "1997 Uniform Code for Building Conservation." The Engineer shall prepare a section in the report covering non-structural evaluation, summarizing the sensitivity ratings of the various components, and commenting on the relative urgency of further study or action on those elements rated dangerous. Comments shall be made as to the relative urgency of correcting structural versus non-structural deficiencies.

2.3 Set of Structural Plans, Notes, Specifications, and Details for construction of seismic upgrade requirements.

2.4 Construction Cost Estimate for the seismic upgrade portion of the work.

2.5 Engineer shall assist in answering questions during bidding of the project.

2.6 Engineer shall attend one pre-construction conference.

2.7 Engineer shall assist in all requests for information during construction.

III. Assumptions

3.1 All survey, investigation and inspection work on site must be coordinated and scheduled through a designated representative or the Contracting Officer and/or the Project Manager.

3.2 City Of Modesto shall furnish the following documents for use and return by the Engineer:

3.2.1 Existing Drawings, Calculations, and other documents (as available).

3.2.2 Geotechnical Report by Geomatrix Consultants, Inc., assessing seismic hazards for the Federal Building at 12th and I Street, used for the evaluation of this building in 1997 by Degenkolb (APPENDIX D of their report)

3.3 All materials developed as a result of the study shall be the property of City Of Modesto. The work identified and the recommended solutions shall avoid establishing parameters, which favor the distinctive capability of a particular firm; rather, it shall define the objective factors relevant to this building, which may be responded to by any competent design firm.

IV. Services/Work Not Included

4.1 Investigation of the site for possible seismic-related geotechnical hazards, such as surface fault rupture, soil liquefaction, differential compaction, land sliding and flooding, as this is typically found in Geotechnical Investigations Report.

V. Schedule of Submittals:

5.1 Design Review Submittal at 60% Completion Stage (to be submitted twenty-one (21) calendar days from receipt of Work Order Number). The submittal at 60% completion stage of the Seismic Hazard Evaluation report shall include at least the findings of the site evaluation and the results that were obtained. The review submittal shall specifically discuss the seismic exposure and predicted behavior hazards and the proposed corrective actions. The report shall contain the following sections: Executive Summary, Introduction, Building Evaluation and Seismic Evaluation. The Engineer shall provide the report in Microsoft Word format and shall not proceed with work prior to receipt of a "Notice To Proceed" from the City Of Modesto.

5.2 Design Review Submittal at 95% Completion Stage (to be submitted fourteen (14) calendar days from receipt of "Notice To Proceed"). The submittal at 95% completion stage of the Seismic Hazard Evaluation report shall include, in addition to the above, Non-Structural Components Evaluation, calculations, conclusions and recommendations, Preliminary Structural Plans (marked NOT for Construction). The report shall contain the following sections: Executive Summary, Introduction, Building Evaluation, Seismic Evaluation, and Non-Structural Components Evaluation, Conclusions and References. The Engineer shall provide the report in Microsoft Word format and Structural Drawings in AutoCAD format and shall not proceed with work prior to receipt of a "Notice To Proceed".

5.3 Following review of the 95% draft submittal, if the City of Modesto determines that a resubmittal is necessary, the Engineer shall make the necessary corrections and resubmit within 14 calendar days from the date of notification by the City Of Modesto.

5.4 Final Submittal at 100% Completion Stage (to be submitted fourteen (14) calendar days from the date of notification of acceptance by the City Of Modesto). The Final Submittal of the Seismic Hazard Evaluation Report shall include, in addition to the above, a section containing "Construction Cost Estimate", which will cover budgetary cost for construction of the seismic upgrade portion of the work only. The Engineer shall provide the final report in Microsoft Word format and final Structural Drawings in AutoCAD format.

5.5 The Engineer and responsible consultants, certifying technical accuracy, completion and coordination of documents furnished, shall sign transmittal Statement.

VI. Compensation

6.1 The breakdown for the cost proposal is as follows:

6.1.1 Estimated hours for each major task by employee classification:

6.1.1.1 Project Management performed by a Registered Civil Engineer: 24 regular hours.

6.1.1.2 Structural Investigation, Analysis and Evaluation performed by a Registered Engineer: 90 regular hours.

6.1.1.3 Non-Structural Components Evaluation performed by a Registered Engineer: 16 hours.

6.1.1.4 Exterior Architectural Appendages/Ornaments/Parapets Evaluation performed by a Registered Engineer: 4 hours

6.1.1.5 Construction Administration, Construction Cost Estimate, and Field Consulting Services provided by a Registered Engineer: 24 hours.

6.1.1.6 AutoCAD Drafting and Structural Plans management performed by a Designer: 36 hours.

6.1.2 Hourly salary cost for each employee classification:

6.1.2.1 Registered Civil Engineer: $100 per hour (Total Hours from 6.1.1 = 158 hours)

6.1.2.2 Designer: $65 per hour (Total hours from 6.1.1 = 36 hours)

6.1.2.3 Administrative Assistant: $45 per hour (Total hours from 6.1.3 = 8 hours)

6.1.3 Indirect and overhead rates:

6.1.3.1 Administrative Tasks performed by Administrative Assistant: 8 hours

6.1.4 Miscellaneous direct costs:

6.1.4.1 Drawings: $10.00/page, above original 3 sets included in price.

6.1.4.2 Copies: Cost + 15% markup. Approximately $60.00

6.1.4.3 Misc.: At cost, shipping where applicable.

6.2 Complere Engineering Group will provide the services as listed in this proposal for the net "fixed fee" of $20,350.00. This amount includes a 10% contingency.

6.3 Invoicing will be generated on a Bi-weekly basis as the work progresses.

APPENDIX B

COST ESTIMATE

By

Complere Engineering Group, Inc.

Complere Engineering Group, Inc. 4230 Kiernan Ave., Suite 210, Modesto, CA 95356 Tel 209.545.8165 Fax 209.545.8170

Construction Cost Estimate

1. Replace Roof:
   13,120 SF @ $4.50/SF = $59,040.00

2. Purchase and Install (2) TS 4"x4"x3/8" collectors 1 @ 61' length 1 @ 93' length

Material	$6,000.00
Labor	$15,000.00
Total	$21,000.00

3. Install Bracing on 105 linear feet of nonstructural walls

Material	$500.00
Labor	$3,500.00
Total	$4,000.00

4. Replace (3) interior glass windows $2,000.00

5. Install lateral and compression bracing for T-Bar ceiling and light fixtures
   $4,800.00

6. Install new 2'x4' ceiling tile:
   9,600 SF x $4.00/SF $38,400.00

7. Replace ceiling grid as directed by owner, estimated $2,500.00

8. Sub-Total of items 1 through 7

Sub-Total of items 1 through 7	$131,740.00
10% Design Contingency	$13,174.00
7 % Construction Contingency	$9,222.00
20% Contingency for General conditions and Contractor's Overhead and Profit	$26,348.00
Total of items 1 through 7 & contingencies	$180,484.00

Total Seismic Upgrade, including complete roof replacement (not including hidden damage) is approximately $13.76 per SF.

Estimated time for construction is three (3) weeks if building is unoccupied.

Complere Engineering Group, Inc. 4230 Kiernan Ave., Suite 210, Modesto, CA 95356 Tel 209.545.8165 Fax 209.545.8170

APPENDIX C

GEOTECHNICAL REPORT

By

Geomatrix Consultants, Inc.

EARTHQUAKE-RELATED GEOLOGIC/GEOTECHNICAL HAZARD ASSESSMENT FEDERAL BUILDING

12th and I Streets
Modesto, California

INTRODUCTION

This report presents the results of a study conducted by Geomatrix Consultants, Inc., to assess the potential for earthquake-related geologic/geotechnical hazards at the site of the Federal Building (GSA Project ZCA72355, Building No. CA0053ZZ) in Modesto, California, during future earthquakes in the region and possible effects of these hazards on the building. This study was carried out as part of an overall seismic evaluation of the building and was performed in accordance with the applicable requirements of Appendix 12-A, "Geologic Hazard Report," of Chapter 4 of the General Services Administration's handbook, Facilities Standards for the Public Buildings Service, PBS PQ100.1.

SITE AND BUILDING DESCRIPTIONS

The site of the Federal Building is located on the western corner of the intersection of 12th and I Streets in Modesto, California. The building property occupies the eastern quadrant of the block bounded by J Street on the northwest, I Street on the southeast, 12th Street to the northeast, and 11th Street to the southwest. Recent U.S. Geological Survey topographic maps show that the ground surface across the Federal Building site is essentially flat and has an elevation of about 27 to 28 m (90 to 95 ft) above mean sea level (MSL). The only significant topographic feature in the site vicinity is the Tuolumne River, located approximately 1.6 km (1 mile) to the south-southeast.

The Federal Building was designed and constructed in the early 1930s. The ground-level footprint of the building is approximately square, with sides of about 32 m (105 ft). A mostly belowground basement extends beneath the building footprint. The foundation plan shows that the structure is supported on shallow spread- and strip-type footings and has a basement slab on grade with a finished floor elevation of about 26 m (86 ft). The width of the perimeter wall footings typically range from about 0.90 m to 1 m (2.8 to 3.3 ft). The width of interior wall footings range from about 0.3 to 0.5 m (1 to 1.5 ft). Several interior columns are supported on square spread footings with dimensions ranging from about 1.2 to 2.1 m (4 to 7 ft). The plans also show the bottom of all interior footings at about elevation 25.5 m (between elevations 84 and 85 ft) or about 0.5 m (1.5 ft) below the basement floor slab. The bottom of the exterior wall footings are about 1.2 m (4 ft) below the grade of the adjacent ground surface.

LOCAL GEOLOGY AND SUBSURFACE CONDITIONS

The Federal Building is situated in an area mapped geologically as Quaternary alluvial deposits known as the Modesto Formation (Wagner and others, 1991). The Modesto Formation was derived from the granitic core of the Sierra Nevada during the most recent major glacial advance. The Modesto Formation consists predominantly of sand, silt, and mixtures of these two soils. The precise depth of these soils in the vicinity of the Federal Building is not known.

Little site-specific subsurface information is available for the Federal Building site. The log of a single test pit, which was excavated about 40 m (130 ft) northwest of the corner of 12th and I streets and approximately 11 m (35 ft) southwest of 12th Street, was shown on the original Federal Building site plan. The pit was about 3 m (10 ft) deep and an auger was used to penetrate the soil another 2 m (6 ft) below the pit bottom. The soil profile shown on the log consists of a 0.3 m-thick (1 ft) pavement section overlying about 0.8 m (2.5 ft) of black adobe clay. About 1 m (3 ft) of gray hardpan and 3 m (10 ft) of gray sand was encountered below the adobe soil. The bottom elevations given for the footings and basement slab indicate them to be founded in the sand stratum. Groundwater was not noted in the test pit log.

During our site reconnaissance on December 13, 1994, an attempt was made to obtain additional subsurface information for the site vicinity. Files of the City of Modesto Building Permit Department were searched for the logs of boreholes drilled at nearby sites. A local geotechnical engineering firm also was contacted. Our search did not yield additional useful information.

EARTHQUAKE SOURCES

Fault systems and earthquake sources considered capable of events that could produce significant ground shaking at the Federal Building site have been identified and are shown on Figure 1; the area considered stretches from the San Andreas fault in the central Coast Ranges on the west to the boundary between the Sierra Nevada and the western part of the active Basin and Range province on the east. Based on their great distance from the project site and/or their expected maximum credible earthquakes (MCEs), some known active faults within this area are judged incapable of producing significant ground shaking at the site. These faults include Coast Ranges faults such as the Hayward and Calaveras, Basin and Range faults in central and eastern Nevada, and faults along the east side of the Sierra Nevada, including the Owens Valley and Hilton Creek faults. In the discussion that follows, the signifiant faults/earthquake sources are divided into three geographic categories: those that lie within the Coast Ranges, those that lie along the boundary between the Coast Ranges and the San Joaquin Valley, and those that lie within the Sierra Nevada.

Faults in the Central Coast Ranges

Two faults, the San Andreas and the Ortigalita, have been identified as Central Coast Range faults that may produce significant earthquake ground shaking at the Federal Building site.

The San Andreas fault, the predominant active fault in California, is one of the longest and most active faults in the world. Extending about 1200 km (750 mi) from the Gulf of California north to Punta Gorda (Cape Mendocino), it forms the boundary between the North American and Pacific plates. The Federal Building site lies about 98 km (61 mi) east of the San Andreas fault. Right-lateral strike-slip displacement during the past several million years has produced cumulative offsets of several hundred miles. Along much of its length, including through the San Francisco Bay region, the San Andreas fault displays spectacular geomorphic evidence of geologically recent faulting. The fault has generated two great (M 8) earthquakes during the historical period (the 1857 Fort Tejon and the 1906 San Francisco earthquakes).

The segment of the San Andreas fault closest to the Federal Building generated both the 1906 earthquake, which is considered by many to represent the maximum earthquake for this part of the fault, and the 1989 Loma Prieta earthquake (M_s 7.1). The segment of the fault that ruptured in 1906 extends about 430 km (270 mi) from Shelter Cove on the north to San Juan Bautista. The moment magnitude (M_w) for the 1906 earthquake is now believed to be about 8.

The Ortigalita fault is a northwest-trending structure located near the eastern margin of the central Coast Ranges along the eastern Diablo Range. At its closest approach, this fault lies about 46 km (29 mi) southwest of the Federal Building site. The Ortigalita fault separates the Franciscan Complex core of the Diablo Range from the steeply dipping beds of the Great Valley Sequence that forms the western margin of the San Joaquin Valley. Topographic features found along this fault, geologic relationships exposed in trenches excavated across its trace, and associated seismicity all indicate right-lateral strike-slip displacement (Anderson and others, 1982; LaForge and Lee, 1982).

Detailed studies performed by the U.S. Bureau of Reclamation for San Luis and O'Neill Forebay dams (Anderson and others, 1982; LaForge and Lee, 1982) showed that the fault consists of four distinct en echelon segments 16 to 27 km (10 to 17 mi) long that extend from Panoche Valley on the south to approximately 22 km (14 mi) north of San Luis Reservoir. The most recent slip on these segments ranges from less than 3000 years (late Holocene) to less than 15,000 years (latest Pleistocene) before present. Although the slip rates and recurrence intervals are poorly constrained, the Ortigalita fault probably has a low rate of activity compared to other strike-slip faults in central California. In a recent seismic risk analysis for the southern area of the Sacramento-San Joaquin delta, the U.S. Bureau of Reclamation judged a M 6.5 event to be a characteristic maximum earthquake for the Ortigalita fault and estimated an average recurrence interval of 5000 years (Ostenaa and others, 1989). Anderson and others (1982) considered the fault capable of generating a M = 6.5 to 6.75 earthquake.

Faults Along the Coast Ranges-San Joaquin Valley Boundary

The Coast Ranges-Sierra Nevada Boundary Zone (CRSNBZ), which approximately coincides with the physiographic boundary between the Coast Ranges and the Great Valley, lies about 27 km (17 mi) west of the proposed Federal Building. The CRSNBZ is inferred to be the structurally complex, buried contact between the granitic and metamorphic rocks of the Sierra Nevada Block and the deformed basement rocks of the Coast Ranges, which consist of the Franciscan Complex and the Great Valley Sequence. The contact between these two crustal blocks is expressed at the surface by a major upwarp along the west flank of the Great Valley syncline, and in the subsurface by an eastward-moving wedge of basement rock that contains both east- and west-dipping reverse and/or thrust faults. As indicated by earthquake focal mechanisms (Wong and Biggar, 1989), the CRSNBZ also represents the transition from the predominantly strike-slip faulting of the San Andreas fault system in the Coast Ranges to the relatively stable, extensional tectonic regime of the Sierra Nevada block.

The fundamental tectonic character of the CRSNBZ and the rate and distribution of strain accumulation and release along it are only beginning to be studied and understood. The overall dimensions of the boundary zone clearly are such that if any substantial fraction of the system of reverse and thrust faults that underlies it were to rupture in a single event, the resulting earthquake would be very large. The geomorphic and structural aspect of much of the CRSNBZ boundary indicates relatively uniform deformation and uplift, providing little basis for assuming that the underlying structure is highly segmented. This in turn suggests that strain may accumulate and be released fairly uniformly throughout large reaches of the boundary structure. For purposes of estimating ground motions in the southern Sacramento-San Joaquin delta area, the U.S. Bureau of Reclamation treats the CRSNBZ as a single, continuous, segmented fault source along the western margin of the Great Valley. They assign it a characteristic magnitude of 6.5 and an average recurrence interval of 1000 years (Ostenaa and others, 1989).

The Vernalis fault is the closest potentially active seismic source; it is located about 22 km (14 mi) west of the Federal Building site (Figure 1). Although it is a subsurface reverse or thrust fault that poses no surface faulting hazard and does not displace beds of Holocene age (past 11,000 years), the Vernalis fault is probably an active element within the CRSNBZ. In this regard, it may be similar to compressional faults that may have generated the Vacaville-Winters earthquakes (M_I 6.5, 4/19/1892; and M_I 6.25, 4/22/1892) along a segment of the CRSNBZ to the north near Vacaville, or the Coalinga earthquake (M_w 6.4, 5/2/1983) to the south near Coalinga (Geomatrix Consultants, 1993).

Based on structural geologic modeling, subsurface geophysical profiling, and earthquake hypocentral locations and focal mechanisms, we postulate that seismic sources (all reverse and thrust faults) within the wedge envelope may lie within 20 to 30 km (13 to 19 mi) of the Federal Building site and can generate earthquakes of magnitude 6½ to 7.

Faults in the Sierra Nevada-Foothills Fault System

The Foothills fault system of the western foothills of the Sierra Nevada is a belt of steeply dipping faults, which extends for about 180 miles from near Mariposa on the south to the Feather River on the north and corresponds approximately to the line of inflection between the Sierra Nevada uplift on the east and the Great Valley downwarp on the west. The Foothills fault system contains two major components, the Bear Mountains fault zone on the west and the Melones fault zone on the east (Figure 1). As evidenced by displaced late Tertiary and Quaternary (< 2 million years) deposits, a few elements of the Foothills fault system are active and are capable of producing surface rupture and ground shaking (PGandE, 1978; Woodward-Clyde Consultants, 1978a,b). Most of the capable faults identified within this system are high-angle normal faults resulting from minor intrablock adjustments to east-west crustal extension. At the latitude of the City of Modesto, active faulting and earthquake generation within the Sierra Nevada crustal block appear to be confined to weak zones within the Foothills fault system.

Regional studies show the Bear Mountains fault zone to be a northwest-trending shear zone intruded by serpentinite bodies and lying within the belt of pre-Cenozoic basement rocks that are west of the Melones fault zone. In contrast to the Melones fault zone, the Bear Mountains fault zone shows little contrast in age, rock type, or degree of deformation of the rocks across it. Individual faults within the Bear Mountains fault zone displace the Table Mountain Latite, a lava flow that filled a former channel of the Stanislaus River between 8 and 9 million years ago. The closest strand demonstrably active in the late Quaternary (past 700,000 years) to the Federal Building site is the Negro Jack Point fault, which is expressed at the surface of the lava flow by an east-facing scarp that ranges in height from 2.4 to 9 m (8 to 30 ft) (Woodward-Clyde Consultants, 1978a). At its closest approach, the Negro Jack Point fault lies about 48 km (30 mi) northeast of the Federal Building site. The strands of the Melones fault zone that show evidence of late Quaternary faulting are the Rawhide Flat East and Rawhide Flat West faults, which lie about 59 km (37 mi) northeast of the site.

No earthquakes greater than M 4 have occurred along the Foothills fault system in the general vicinity of the Federal Building site during historical time. The largest earthquake associated with any part of the Foothills fault system during historical time is the M_L 5.7 shock of the Oroville sequence, which occurred on the Cleveland Hill fault. Based on three independent lines of evidence--historical seismicity, observed displacements of surficial soils in trenches along the Foothills fault system, and the linear continuity of faults--Bolt (1977) drew the following conclusions for dam sites on the Mokelumne River:

> *"In summary, the three arguments given above all lead to earthquake sources in the shear zone in the vicinity of the dam sites (Pardee and Camanche) as between 5.2 and 6.1 ± 0.3 in magnitude. For design purposes, an upper*

bound of M_L = 6.25 seems appropriate. Such sources would likely be predominantly normal dip slip with focal depths between 5 and 10 kms."*

Although Woodward-Clyde Consultants (1978a) concluded that the Rawhide Flat East and Rawhide Flat West faults are capable, they assigned no probable magnitude to future events on them. However, in their 1977 study of the Auburn Dam site (Volume 7, Section 6), Woodward-Clyde judged that the MCE for active faults (USBR criteria) in the western Sierra Nevada is a magnitude 6.0 to 6.5 event.

PERFORMANCE DURING HISTORICAL EARTHQUAKES

Earthquakes occurring in the vicinity of the City of Modesto and the Federal Building site have been rare. Since 1800, there have been only eight earthquakes that have reportedly caused ground shaking in Modesto with effects of Modified Mercali Intensity (MMI) VI. Table 1 summarizes characteristics for these earthquakes that occurred at epicentral distances of about 100 km (60 mi) from Modesto. The following are excerpts from reports of earthquake effects in Modesto for two of the earthquakes felt in Modesto.

Earthquake of April 18, 1906, M 8.3, MMI V-VI, Effects in Modesto

> *"In common with other points in the great interior valley region, Modesto received a very decided shaking up by the earthquake, but suffered practically no damage. The local effects were the stopping of clocks, the swaying of trees, hanging baskets, drop-lights, and chandeliers; and in a few cases the fall of objects from insecure positions in stores and dwellings. Water tanks and troughs, milk pans, etc., spilt part of their contents, and in one or two instances cracks opened in buildings. No one, so far as known, actually timed the duration of the shock in seconds.*
>
> *"The observations of many persons in and near the town indicate that the vibrations were in two principal directions: viz. northwest-southeast and approximately west-east. The heavier shock seems to have been in the first direction, but observers are not in entire agreement on this point. Clocks of larger size were quite generally stopt, no matter in what direction they faced. Several persons report having heard a roaring or rumbling sound, beginning a few seconds before and continuing until the end of the disturbance; and a number of people were affected by symptoms somewhat like seasickness for several hours after it" (Lawson, 1908).*

Earthquake of January 24, 1980, M 5.7, MMI VI Effects in Modesto

- *"The press reported the swimming pool cracked and two windows were shattered at the Suburban Lodge Motel on McHenry Avenue. Other damage reported was a cracked driveway at a home and a cracked wall at Enslen School. At a home near downtown, the people ran outside, a shelf smashed to the floor and cracks appeared in a bedroom ceiling." (Stover and von Hake, 1984).*

No earthquakes have produced effects reported to be greater than MMI VI during the historical time period (Table 1). Ground motions from the 1989 Loma Prieta earthquake did not trigger a recording device located in Modesto. In addition, there are no reports of ground failure or related damage/distress for the site vicinity associated with this or other historical earthquakes.

EARTHQUAKE-RELATED HAZARDS

Hazards assessed for the site during this study include the potential for surface fault rupture, liquefaction, landsliding, differential compaction, and flooding.

Surface Fault Rupture

There are no active faults identified at or in the immediate vicinity of the Federal Building site as discussed previously, the nearest known active faults are approximately 22 km (14 mi) from the site. Based upon this, it is our opinion that the potential for surface fault rupture at the Federal Building site is negligible.

Liquefaction

Liquefaction is a soil behavior phenomenon in which a soil loses a substantial amount of strength due to high excess pore-water pressure generated by strong earthquake ground shaking. Recently deposited (geologically) and relatively unconsolidated soils and artificial fills located below the groundwater table are susceptible to liquefaction. As discussed previously in this report, subsurface information for the Federal Building site is very limited. However, although the depth of the groundwater table is uncertain, it is believed to be significantly below the foundation level. Because there is no observed or reported evidence of liquefaction or related ground failure phenomena in the immediate site vicinity during historical earthquakes and the likely significant depth of the groundwater table, it is our judgment that the soils at the Federal Building site are not susceptible to earthquake-induced liquefaction and, therefore, that hazard-associated liquefaction is very low to negligible.

Landsliding

As discussed, the ground surface at the site is essentially flat. The soils underlying the site are considered to be competent and probably not susceptible to earthquake-induced liquefaction or other significant strength changes that would affect site stability. Similarly, there is no observed or reported evidence of site instability or of ground failure in the site vicinity during historical earthquakes. Therefore, it is our judgment that the hazard at the Federal Building site due to landsliding/ground instability is negligible.

Differential Compaction

Dissipation of excess pore-water pressures generated in soils by ground shaking will produce volume decreases (compaction) within the soil that are manifested at the ground surface as settlement. Differential settlements may occur due to spatial variations in soil characteristics and variable foundation loads. For most circumstances, shaking-induced ground settlement is not considered to be a significant (i.e, life-threatening) hazard except in its most severe forms when associated with liquefaction. As described previously, the materials on which the foundations and footings bear are generally sandy soil. Provided these soils are not saturated, they will not be susceptible to earthquake-induced liquefaction; therefore, it is our judgment that hazard to the Federal Building due to differential compaction settlements is very low to negligible.

Flooding

As stated previously, the Federal Building is located in the central San Joaquin Valley where the ground surface elevation at and in the immediate vicinity of the site is approximately 26 m (90 ft) above mean sea level. Therefore, in our judgment the likelihood of earthquake-induced flooding of the Federal Building site is essentially nil.

SUMMARY

Evaluation of geologic maps, site-specific geotechnical information, and reported effects of historical earthquakes for the vicinity of the Federal Building in Modesto, California, indicate that there is a very low to negligible likelihood of adverse effects to the building due to earthquake-related geotechnical hazards such as surface fault rupture, liquefaction, landsliding, differential compaction, and flooding during earthquakes in the region. Because of the potential for moderate to large (M>6) earthquakes on the regional seismic sources, higher levels of strong ground shaking than have been recorded in historical times may occur at the site.

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GEOMATRIX

TABLE 1

SIGNIFICANT EARTHQUAKES WITHIN A 100-KM (60-MILE) EPICENTRAL DISTANCE OF MODESTO SINCE 1800

12th and I Streets
Modesto, California

Date	Magnitude	Maximum MMI	Epicentral Distance From Modesto km (mi)	Reported MMI
10/21/1868	6.8	IX+	96 (60)	V-VI
04/10/1881	5.9	VI	50 (31)	VI
06/20/1897	6.2	VIII	84 (53)	V-VI
07/06/1899	5.8	VII (?)	64 (40)	VI
04/18/1906	8.3	IX	54 (87)	V-VI
03/11/1910	5.5	VI (Rossi Forel)	103 (65)	V-VI (Rossi Forel)
07/01/1911	6.6	VIII	77 (48)	VI
01/24/1980	5.7	VII	61 (39)	VI